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AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION.

ISSUED WEEKLY BY THE AMERICAN MACHINIST PRESS,

Vol. 22. 218 WILLIAM STREET, NEW YORK. No. 12.

Contents and Index to Advertisers, Page 12.

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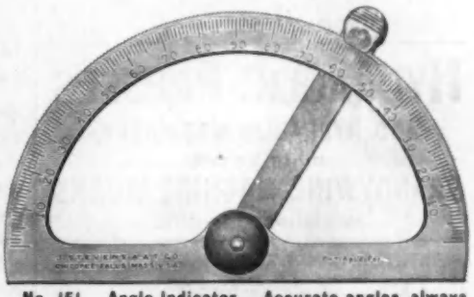

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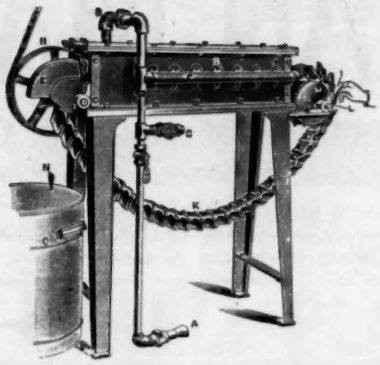

may not have the slightest interest for you, but we show a machine that we designed for that purpose, simply to illustrate the point that we devise and build hardening and tempering machines for all sorts of special uses—machines that not only do the work better than it was ever done by any other method, but that very greatly reduce the cost of such work, at the same time.

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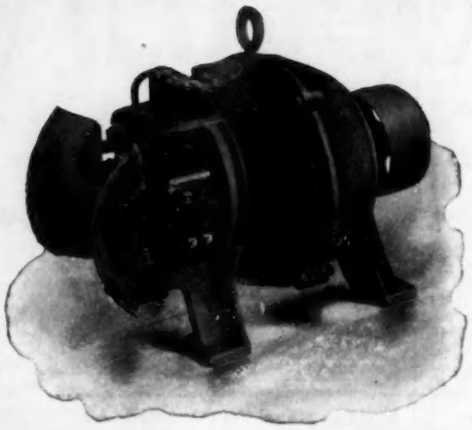

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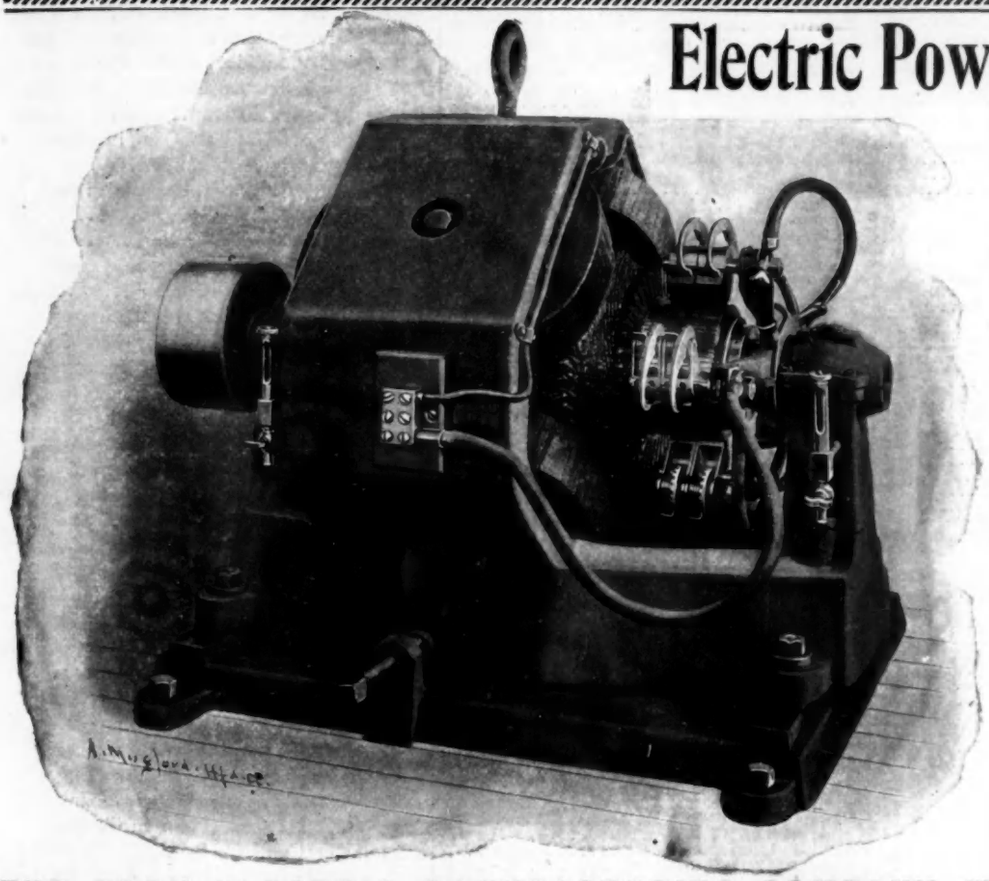

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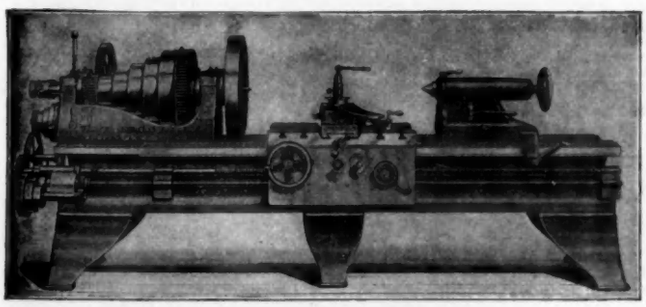

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AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION

VOLUME 22 NEW YORK, THURSDAY, MARCH 23, 1899 NUMBER 12

Improvement of Product Through the Co-operation of Shop and Drawing Office.

Our readers will recall our publication of the plan in use by the Lane & Bodley Company for securing suggestions for the improvement of catalogs and printed matter. A somewhat similar but much more far-reaching plan is in use at the works of the Brown & Sharpe Manufacturing Company for securing suggestions from the shop for the improvement of the various machines which comprise the product of the company.

In carrying out this plan each foreman and other leading man has supplied to him a stub and fly book—like an ordinary check book—one page of which is shown in Fig. 1. These books are numbered and paged, as shown, with blanks for the "time" or symbol for the machine to which the suggestion relates, the drawing number and other items needing entry. On the bodies of the fly and stub suggestions for improvement are made. The fly is then detached along the perforations and is sent to the drawing office for attention. The suggestions relate to all manner of features connected with the shop side of the work. Thus a lack of clearness in a drawing, the omission of a needed dimension figure, or a lack of sufficient stock at some point in a casting may be pointed out. Again, some awkward feature which might be obviated, a change in the jig used, a deficiency or mistake in the jig list may be pointed out, or an actual change in the design of the machine may be suggested—these changes ranging from some small detail to perhaps a complete re-organization of the machine. An example of one of the suggestions on No. 3 automatic gear-cutting machine is "Return-clutch wedge—make thread finer so that adjustment may be more delicate." On the No. 5 plain milling machine the two following suggestions are made: "The feed-cam shaft is too long to be made on screw machine. Please put it on the stock list"; and "I would suggest changing the arm-support stands so we can mill them." Arriving at the drawing office, the suggestion is first given a serial number in the lower left-hand corner, marked *a*, Fig. 1, and the suggestion is then examined. If it relates to something requiring immediate attention it is taken in hand at once, but should it be of such a nature that it can only be put into effect on the succeeding lot of machines, it is filed in an envelope belonging to the machine to which it relates, this envelope being filed with others in a card index case kept in the head draftsman's desk. Upon the outside of the envelope is pasted a record sheet, shown in Fig. 2. In the spaces *a* are entered the serial numbers, in *b* the book numbers and in *c* the book page numbers. Spaces *d* are reserved for the initials of the party in whose hands the card is placed for attention and for a check mark signifying that the matter has been attended to and the card removed to the permanent file.

The cards which are not attended to at once remain in the head draftsman's file, which file is consulted whenever a new lot of machines is to be started, when such suggestions as are approved by the head draftsman are incorporated in the drawings and the cards are checked off and removed to the permanent file. Should a suggestion be of a revolutionary character, its card may remain in this file until a redesign of the machine is undertaken; but in any case it remains there until the suggestion is incorporated in the design or is decided to be undesirable. Occasionally these cards get mislaid and lost, in which case the entry of the book and page number on the record sheet enables its duplicate on the stub to be looked up.

The degree to which this system is worked is surprising. On an average, about half a dozen of the cards are sent to the head draftsman's desk per day, and on some of the machines put out by the Brown & Sharpe Manufacturing Company

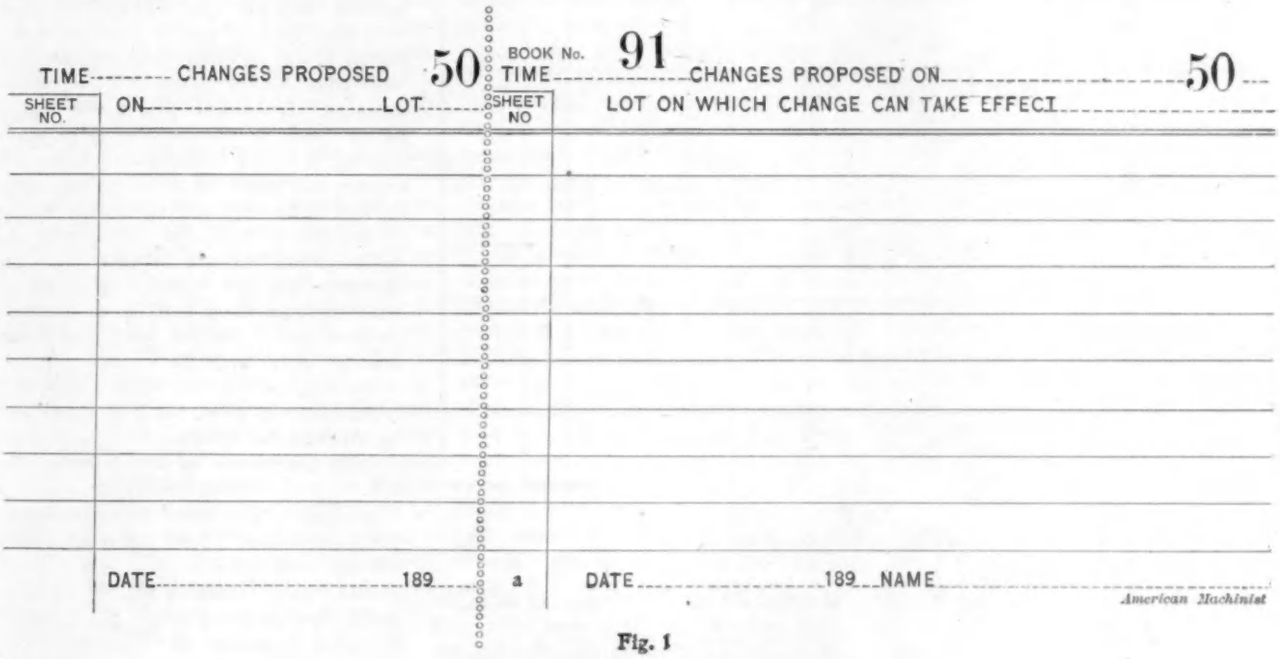


Fig. 1

STUB BOOK FOR RECORDING SUGGESTIONS.

the cards received to date number over two hundred.

No shop man will need to be told of the great usefulness of this plan. The shop sees the work from a different standpoint from that of the drawing office, and no draftsman or set of draftsmen can see the numerous points which force themselves to the attention of those in the shop. Not only is this true of the machines in their future capacity and use, but especially is it true regarding slight changes which greatly facilitate their manufacture.

It is, however, probable that the value of the system is still greater from its effect in promoting a spirit of co-operation throughout the works. We all know how things go in the usual course. Someone in the shop sees some point which could be changed with advantage, and at the first opportunity he buttonholes someone from the drawing office as he is going through the shop. The matter cannot be attended to then, and when it can be attended to is—forgotten. Meanwhile the shop man considers that he has been ignored and snubbed. "The drawing office wants all the glory, and won't take any suggestion from the shop. A shop man had better saw wood and say nothing if he expects to get along here." Meanwhile not only has a spirit of antagonism been encouraged, but perhaps a valuable suggestion has been lost. With the plan here described it naturally follows in many cases that when the incorporation of a suggestion in the drawings comes up, a consultation between the head draftsman and the party making the suggestion becomes advisable, all of which tends to promote the spirit of co-operation already referred to. The plan is of such obvious value that it deserves to be widely copied. We are persuaded that there are very few shops in the land which would not derive decided benefit from it.

It will be remembered that the National Cash Register Company, of Dayton, Ohio, employ a system for encouraging and making use of suggestions made by the men in the shop, and it is considered one of the most valuable features of their business; cash prizes being awarded at stated periods for the most valuable suggestions.

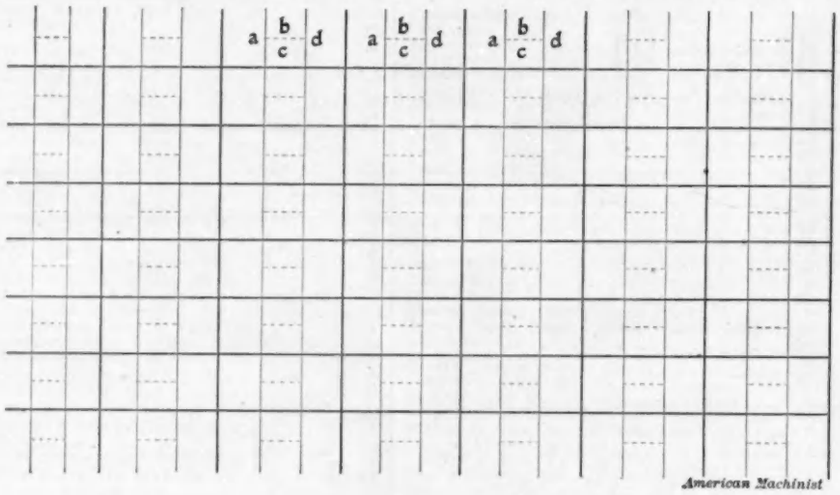


Fig. 2

TICKET FOR LISTING SUGGESTIONS.

An Engineer's Winter Troubles.

BY W. H. WAKEMAN.

In a certain shop there are two boilers, both of which, as a rule, are used for power and heating; but occasionally one of them is laid off for repairs, and, if the weather is not very cold, the engineer can keep up the required pressure with one of them, so long as the fire is kept clean. He was running under these conditions one day, when some of the machinists concluded that they were not warm enough, and commenced to search for the cause of the trouble. One of them came into the boiler-room and discovered that only one boiler was in use, and that settled the matter at once; for was it not plain to all concerned that one boiler cannot give out as much heat as two? The fact that the usual pressure was on at the time and that the pipes were filled with steam had no effect on the supposed low and dispirited condition of the thermometer, for there was only one boiler in use.

The condition of the thermometer makes but little difference with the average machinist anyway, for he knows whether it is cold or not without looking at it. There is a good as well as a bad side to this trait, for if the engineer usually gets there early and has the shop warm at 7 o'clock, the machinist knows before he gets there that it is warm, and if the engineer oversleeps some fine morning, and does not get steam on as early as usual, it makes but little difference, for the machinist believes it to be warm, and before he discovers the mistake, it really is warmed up.

When the fire needs cleaning the steam pressure lowers, and the natural consequence is that the point of cut-off is lengthened, thus discharging steam at a higher terminal pressure, and putting a larger volume into the heating pipes; and as they are not large enough to dispose of it, the back-pressure valve opens and discharges it into the air. Seeing this waste of steam, the machinists begin to feel cold and complain to the engineer, who proves to one of them that the pipes are full of steam and that no more can be done; but that is not satisfactory, for as long as so much steam can be seen going to waste, they are cold.

Engineers who have given the matter due attention know that if the cut-off valves of a Corliss engine are set for an even cut-off with a light load, it will not be even when a heavy load is put on, and therefore if it is increased until the limit of cut-off is reached, one of the valves will fail to trip before the other stops cutting off, thus causing a heavy discharge of exhaust steam at each alternate half-stroke. Then unless the back-pressure valve is loaded very heavily, this will cause it to open, and when the shop hands see this, they not only feel cold for lack of steam, but they are convinced that the engine is out of order, and it requires a large amount of evidence to change their opinions. If enough weight was added to the lever to prevent the valve from opening, it would increase the load on the engine, and unless all of the steam could be used in heating, this extra load would be a complete loss. In such a case the engineer must choose between adopting measures that are wasteful in order to make the men think that he understands his business, on the one hand, and doing what he knows to be for the best interests of his employer on the other. His duty in the matter is plain, but it is not always easy to face the dilemma, as it is pleasant to have the respect of our fellow-workmen.

In shops where there is not sufficient radiating surface to keep the rooms warm the men will insist on having the back-pressure valve weighted heavily so as to create more pressure in the pipes, and if the valve is outside of the engine room they will add weights to it without asking permission of anyone, and sometimes this is carried to excess. A case of this kind, in which I am familiar with the particulars, will serve as an illustration of this point. A certain engine appeared to be overloaded, as its speed was reduced, even when the highest boiler pressure available was carried. While investigating the subject it was suggested that possibly the valves were not properly set, so an indicator was applied and the diagrams showed that they were so near right that any change in them would not make a material difference in the power developed, but the back pressure was so great that it represented one-third of the power of the engine. The back-pressure valve was located three stories above the engine, and if I had a photograph of it at that time I

should be pleased to present it, for the array of specimens of wrought and cast iron that was hung on its lever would make an interesting picture. Here was a case where the proprietors were considering the plan of putting in a larger engine to do the work, because the employees were trying to force the exhaust steam through pipes that were not intended for so large a volume of it. It is true that by increasing the back pressure they raised the pressure in the heating pipes, and thus secured a little more heat, but it is evident that it was very expensive heating. The engine was subsequently taken out and a larger one was put in because more power was required.

In another instance it was necessary to get more heat into an isolated room, and a coil of pipe was put into it, which was fed with live steam. There was a drip valve on the outlet pipe, which the engineer adjusted so that it would relieve the coil of the water of condensation, but he noticed that steam was traveling through the feed pipe at a very rapid rate, after the coil had been in use for a time. Investigation disclosed the fact that some of the men had opened wide the drip valve in an effort to get more heat, and no amount of persuasion would convince them that they were getting good service under any other conditions.

Now let us see which plan is the best. With 75 pounds pressure on the boiler and the drip valve opened just enough to keep water out of the coil, 70 pounds would be realized, the temperature of which is 316 degrees Fah. If the drip valve is opened wide this pressure will be reduced to, say, 5 pounds, the temperature of which is 220 degrees Fah.; and yet they feel the warmest when the latter conditions prevail. If the drip pipe in such a case discharged directly into the air, so that the volume of steam wasted could be plainly seen, the result of poor management would soon be noticed; but usually such pipes discharge into sewers or some other underground passages where it is not readily seen.

Business for the Small Shop.

BY TIMOTHY BROWN.

Those of us who have "been there" will all agree with your editorial endorsement of Mr. Blanchard's article entitled "What Can the Small Shop Do?" That article is all pure gospel, and covers the ground so fully that I don't know that I can add anything of merit to the subject; yet it revives so many reminiscences that I feel tempted to try. The question of what the small shop can do was probably never of more vital importance than now. A generation ago the small shop which depended upon jobbing and special work for its existence could "fill in" by building a few engines or lathes, or some other standard article, which, although sold at small margin in one sense, on the other hand were made largely in odd hours when men and machinery would have been idle. Now things are different. Not only are the large shops better equipped for manufacturing, but in most cases the selling organization is also so complete that the large concern can effect a sale with less expense than the little fellow, and in many cases by reason of being a big concern can command a better price and effect a sale with less persuasion than the small competitor. There are, of course, exceptions to this rule, as in some cases the small producer gets even better prices than the larger one; but to do this regularly his product must have some real points of superiority, or the producer must be an especially adept salesman, or both.

The "small shop" may exist under a great variety of conditions. It may employ anywhere from five to fifty men, and it may be in a large city or in an isolated town, and the nature and origin of such shops may also differ very widely. Perhaps three-fourths of the small shops have started as repair shops; some only intend to repair sewing machines or bicycles, while others try to handle anything they can get in the big front door or stand on the sidewalk. Again, the other shops have been equipped for the manufacture of some small special article which has run its day, and they are straining their "weather eye" now, worse than the fellow who is doing enough jobbing to keep things greased. Glancing thus over the wide range of conditions existing in and around the small shop it would be hard to formulate a better set of rules than Mr. Blanchard lays down, although there are many special cases which cannot be covered by any general set of rules. I have had a good deal to do with special work, from a pie machine to a printing press, and have had men come into the office without even wheels in their head, just "ideas," and expect me to draw in the wheels; and although that pie machine made pies (the real dough and filling kind), and the printing press would print, neither of the machines is on the market, and I would feel like summing up my experience on special work by saying don't do any of it without cash in advance, or at least every Saturday night. This may seem severe, but if your customer has faith in his invention and in your facilities he will not object; and if he does object you are probably better off without him.

I have seen so many small shops with museum attachments that I feel that the cash-in-advance plan is the only safe one. You may think you are smart and know a good thing when you see it; but even if you are, does that say you will get paid for the work when it is finished? You may make the machine do its work, yet there may not be the demand for it as first supposed, or other machines or patents may be discovered with priority or superiority; or, for some reason the inventor may get switched off and leave his baby on your hands, and even if the machine is a success and they are wanted in quantities, it don't follow that you will get them to make. If you are so "dead sure" it is a good thing, you had better make an agreement before you begin, by which you can control the manufacture of the article after you have perfected it.

Just a word in regard to not tying up on big contracts—that is, big for the size of the shop. I remember one instance of this kind where the owner of a comparatively small shop agreed to build and place some machinery amounting to, say, $3,000, the machinery to be set up and running before any payment was made. It was of a class of machinery that was occasionally built in that shop and with which the shop owner was familiar. He thought he knew his customers and that all was right. He completed his contract, set the machinery up and started it, turning out the product in quantity and quality according to agreement. The purchasers verbally accepted the work and promised settlement in a few days. Instead of paying they proved to be rascals, and began to make excuses about the working of the plant, and would never have paid a dollar if the contractor had not managed to outwit them, and after much delay and litigation he succeeded in getting most of his money; but in the meantime he came near losing his business, by putting too many eggs in one basket. Another case that I knew of might come under the head of special machinery. A certain small shop sometimes built machinery for grinding and washing a certain kind of material; we will call it clay. A contract was taken for which a part of the money was to be paid on delivery, and the balance when work was completed. This was a new stock company, composed of rich business men, where the "moral hazard," as insurance men would say, seemed to be excellent. When the machinery arrived they had plenty of money in the treasury and made the first payment all right, but when the plant was started, the clay, with the exception of a small quantity, proved to be worthless, as the ware made from it was not the right color. Then the promoter of the scheme (who had bought this tract of barren land and turned it into the company for a good share of stock and some cash) found he was getting into hot water. His only way out was to blame it on the machinery, saying that it did not wash the clay as it should be washed. The maker of the machinery said that he could wash clay, but he could not make it out of dirt; he had put up a number of similar plants in other places, and knew what he was doing. Some of the stockholders felt that they had been swindled by the promoter; tney quarrelled among themselves, and began to realize that all they had was some special machinery on a barren, out of the way place, and as they had already spent the amount of their capital stock, and a good deal more, which some of them had

loaned to the company, they protected themselves by getting first lien on the property and letting the machinery man whistle for his money.

Moral: If you build machinery for manipulating a special material, don't take chances on losing your pay if that material does not have the qualities it should have.

A good deal of the above is as applicable to the large shop as to the small one, but often one reason why the big shop has "got there" is because it has avoided such shoals, while, again, some of them have got there by getting that weather eye on a gem among the rubbish; for occasionally there is a gem of the first water found among these new and special jobs offered by the inventor, and sometimes the shop tnat helps the inventor to perfect his ideas is rewarded; but the prizes are comparatively few.

Coming back to that little shop; when you started your shop you had quite a good jobbing business, you worked pretty hard yourself, and have improved your facilities as fast as you could, until you have a nice little shop; but now there is another repair shop in your section, or the industries you depended on have moved away or shut down, or put in their own shop, so that you have more shop than work. You might build a few small engines or drill presses, but they have got so cheap that it don't pay for the actual outlay for labor and material when built one or two at a time. Well, can't you build them twenty-five at a time and put in an extra screw or gear that would make them a little better than any other one made? Perhaps a corn planter or a pump would be more in your line, and sell better in your section, or, if you can't sell them there, you can send them down to the city, and if they are a standard article, and are made as well or a little better than the average, you can sell them. It is only a question of price; the probability is that they won't be quite as good as the next lot, but that city dealer will put his name-plate on, and then they will be all right. You may feel dreadfully bad that your name aint on that lot; but when you run across one of them a few years later you may be glad it was not. You say, "Yes, that's all right to tell us, but we would have to sell that lot so cheap that we would not make anything." Well, that depends partly on how you figure it. Some days you have three or four rush jobs all in at once, and all wanted the day before yesterday; your men are all busy and you could use more. But before to-morrow night that work is all out, and the men are walking around looking for 6 o'clock. Next day some of them don't do much else all day, and you can't lay them off and pick them up again when you want them. Now if there is something you can build to fill in and get back the actual cost of labor and material, you had better build it; but look well before you decide what it shall be, as it may develop eventually, so that you will be glad to drop your repair work entirely. Many of the large shops began by building half a dozen small motors or engines, or drill grinders, or pumps, then building lots of twenty-five or more and selling them to dealers, perhaps, trading some of them for new tools as they required them.

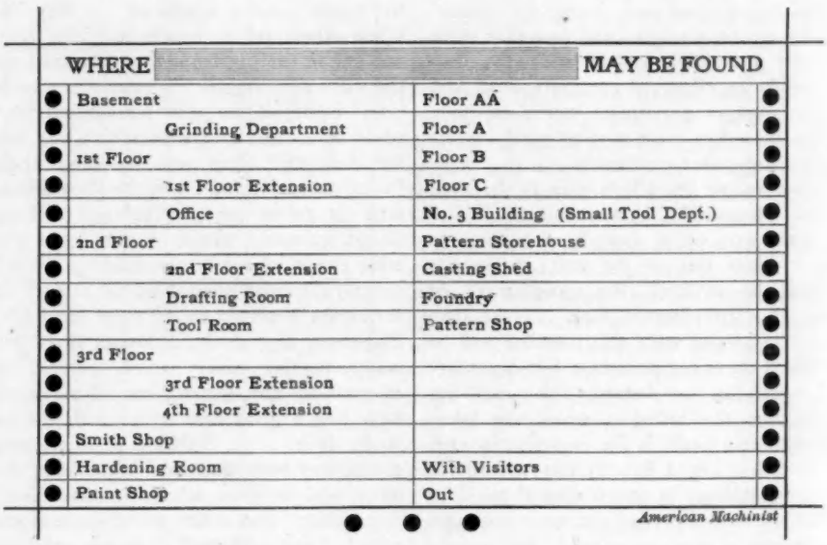
One more suggestion for the little shop; suppose you are in the country, you may occasionally be able to sell an engine or saw-mill or pump on which you get a fair commission. Perhaps you have to trade in an old one to make the deal. Of course you will get it as near scrap price as you can, and often if you pay more than that you are stuck; but again it may be a good piece of machinery which is being replaced by a larger one. You bring the machine into the shop, and in those odd hours you put it in good working order, shine it up, let the cub paint it, and it is "almost as good as new." Perhaps next week or next year, or two years hence, someone comes along who needs it, and you sell it at a good round profit. If you are in the city it may be a motor instead of a saw-mill, and you may have smaller profits and more frequent sales. Of course, in either case you must take care that you don't get filled up with "tombstones"; but if you have not got some business judgment, all we could write in a year would not be much benefit to your little shop.

Finding Men When Wanted.

One of the difficulties which grow with the size of an industrial establishment of any kind is that of finding men when they are wanted, and in a large works, with the needed party moving about, the quest becomes at times almost hopeless. The works telephone assists in a measure, but even with this repeated calls to the various departments are necessary, and the man wanted may be in the department called without the one who answers the telephone being aware of it.

The accompanying reproduction of a blueprint shows the method used at the works of the Brown & Sharpe Manufacturing Company to overcome this difficulty by furnishing the leading men of the works an easy way to leave a statement of where they are going when, for any reason, they leave their regular posts.

Each foreman and other leading man is furnished with one of these prints, which is neatly pasted on a suitable board, hung on or near his desk, and has his name entered in the space at the top, which, in the print, is, of course, white. The print contains a list of all the leading departments, and opposite the name of each a hole is drilled through the board, as indicated by the large dots. With the board three neatly made steel pegs are furnished, which, normally, are placed in the holes at the bottom. Whenever the individual has occasion to go to any other department one of the pegs is placed in the proper hole, so that anyone wanting and not finding him at his post may see at once where he can be found. Should he intend going to more than one department before returning, he uses additional pegs to indicate that fact.



Should he be wanted on the telephone and not for a personal interview, the plan is equally useful, as it enables the party answering the telephone call to say where he is, and a second call finds him.

Not only are the boards furnished but they are *used,* and the plan is found to save much annoyance—not to use a stronger word. It is one of those common-sense methods of accomplishing results which abound throughout the Brown & Sharpe works, but which are apt to escape the eye of the casual visitor.

The engraving is made to a reduced size. The actual size of the print is five by seven inches.

A New Line of Drawing Instruments.

The accompanying illustrations show a line of drawing instruments manufactured by Schwencke, Kirk & Co., of 26 Church street, New York, which possesses numerous points of interest. In design the instruments are a radical departure from the customary shapes—the changes having a bearing on both the methods of manufacture and the use of the instruments. Primarily, the idea is to so adapt the designs as to permit manufacture from rolled sheet metal—the blanks being made in a punching press and being of such shapes as to be cheaply finished after punching. At the same time the material is so disposed as to make the instruments surprisingly rigid in the direction in which rigidity is most necessary. The novelties do not, however, all lie in the direction of adaptability to these methods of manufacture, as will be apparent from the illustrations.

Fig. 1 shows a pair of plain dividers, of which the legs have a peculiar curved shape, the purpose of which is to facilitate adjustment. By grasping the instrument with the fingers at this portion the instrument can be easily opened or closed by varying the pressure and without moving the fingers or using the other hand. Fig. 2 shows a pair of compasses, the arrangement being such that the pivot leg always stands perpendicular to the paper—the instrument being grasped by the extension of this leg. Fig. 3 shows the same method of construction carried a step further to give an instrument of larger reach, but at the same time one of small size when closed up. With the instruments shown in Figs. 2 and 3 lengthening bars are supplied to still further increase their range.

It will be seen that the bars of which the instruments are made are turned edgewise in the direction in which the greatest rigidity is desired—that is, radially—and the result is a surprising degree of stiffness. Fig. 4 shows a small hair-spring divider in which the arrangement of the closing screw is such as to keep the pen perpendicular to the paper without special adjustment. Fig. 5 shows a ruling pen having a novel arrangement for opening the nibs for cleaning—the pen being shown with the nibs open.

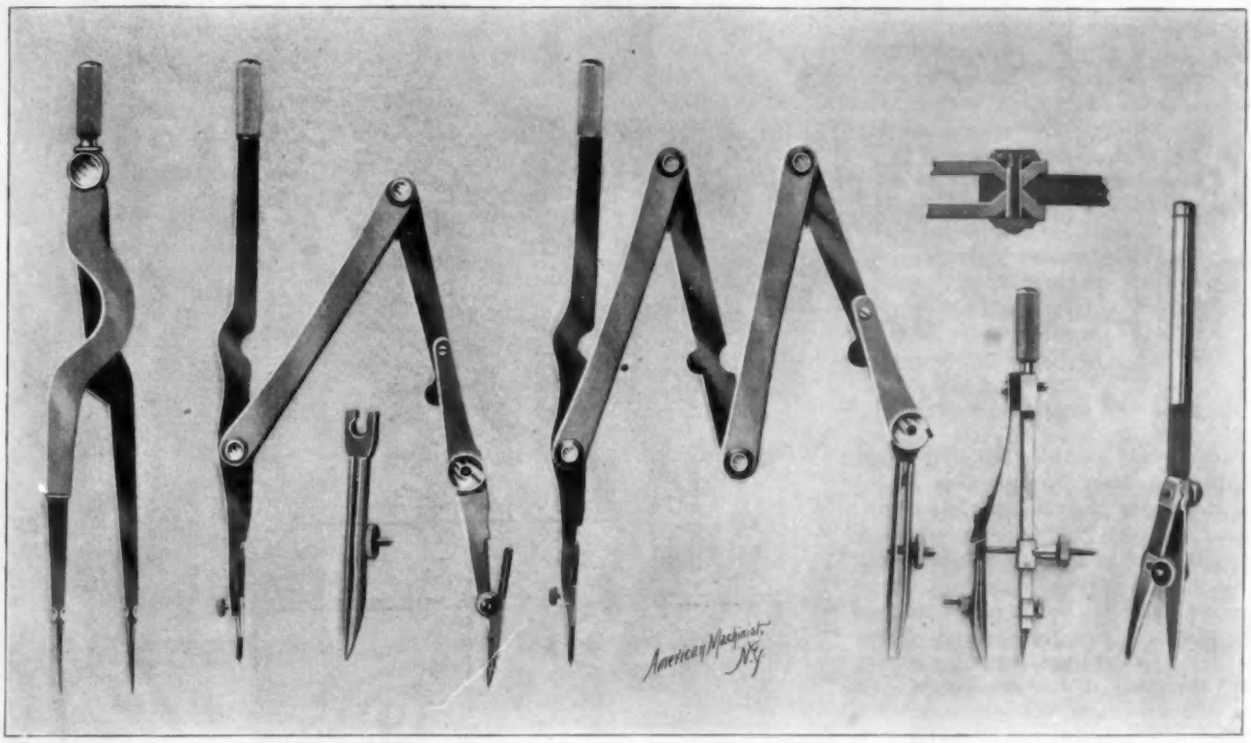


FIG. 1. FIG. 2. FIG. 3. FIG. 4. FIG. 5.

A NEW LINE OF DRAWING INSTRUMENTS.

All of the joints of the instruments are of the cone type, a section being shown in Fig. 6, and these joints give a very smooth and at the same time firm action. The joints for the removal of the pen and pencil points are similar, but with a provision for removal which is shown in Fig. 2.

The instruments are made in a variety of grades. Some are of steel, nickel plated, and others of the customary German silver. Some are comparatively rough in finish, for use by sheet metal workers, while others are finished in the highest style of the art. We are unable, however, to see why even the cheaper instruments should not be thoroughly serviceable and satisfactory.

Milling Machine Feeds.

The desirability of having the feed of milling machines so arranged that the position of the feed belt on the cones shall indicate positively the rate of feed in inches per minute has been referred to in these columns on various occasions, the first article to call attention to the need of this arrangement being, we believe, one by Mr. Miller, published in our issue of September 20, 1884. The size of the cutter has very little to do with the rate of feed, an increase in the size of the cutter being made to accommodate the necessities of the work, there being no necessity for reducing the speed with such a change in the cutter, but if anything, the contrary change should be made. The desirability of so arranging the feed gear that the position of the belt will show the feed is beginning to attract attention among machinery manufacturers, and we show herewith, in Fig. 1, an interesting method of accomplishing this end, which is made use of on the machines by Beaman & Smith, Providence, R. I., and is in fact substantially the same arrangement as that suggested by Mr. Miller in the article referred to above, although this machine is, so far as we know, the first to have this method applied to it.

Fig. 1 is a horizontal plan section of the feed arrangement of the well-known combined vertical and horizontal spindle milling machine made by Beaman & Smith. The countershaft cone pulley is shown at *a*, and the driving cone on the machine

at *b*. On the end of the main driving shaft is a small cone *c*, belted to the companion cone *d* on the intermediate shaft *e*. The worm-feed shaft is seen at *f* and is connected to the intermediate shaft *e* by means of the companion cones *g* and *h*. The essential feature of the arrangement is giving to the pair of cones *c* and *d* substantially the same ratios of speeds as the main driving cones, but arranged in an inverted order. In operation the operator simply places the belt on the steps of the feed cones corresponding to the position of the main driving belt on the main cones—that is, if the main belt is on step *i* the feed belt is placed on step *j*, or if the main belt is on *k* the feed belt is placed on step *l*. The ratios of the two sets of cones being the same, it follows that regardless of the speed of the driving shaft the speed of the intermediate shaft *e* is always the same, and consequently the position of the belt on cones *g* and *h* is always a positive index of the speed of the table. An additional neat feature lies in the arrangement of the cones *g* and *h*, whereby they may be reversed on their shafts, as indicated by the dotted lines, the result being that the first speed in the reversed position is the same as the last speed in the original position, and for other steps the speeds in the reverse position form a regular series in addition to the speeds given in the original position, the number of speeds available being thus nearly twice that due to the number of steps on the cones.

Another valuable feature of this machine lies in the method for securing an abundant range of feeding speeds in the circular milling attachment which goes with the machine. Of course a much wider range of feeds is required in circular than in straight milling, because of the influence of the diameter of the piece operated upon on the peripheral speed without change in the feeding gearing. This arrangement is shown in Fig. 2. At *g h* will be seen the end views of the pulleys carrying the same letters as in Fig. 1. At *m* is a bracket secured to the bed of the machine, carrying the worm feed shaft *n* and a stud *o* connected by gearing having a ratio of four to one. Shaft and stud have the same radial distance from pulley *h*, and a cone pulley may be placed on either shaft or stud and be belted from *h*, one position giving four times the speed of the other.

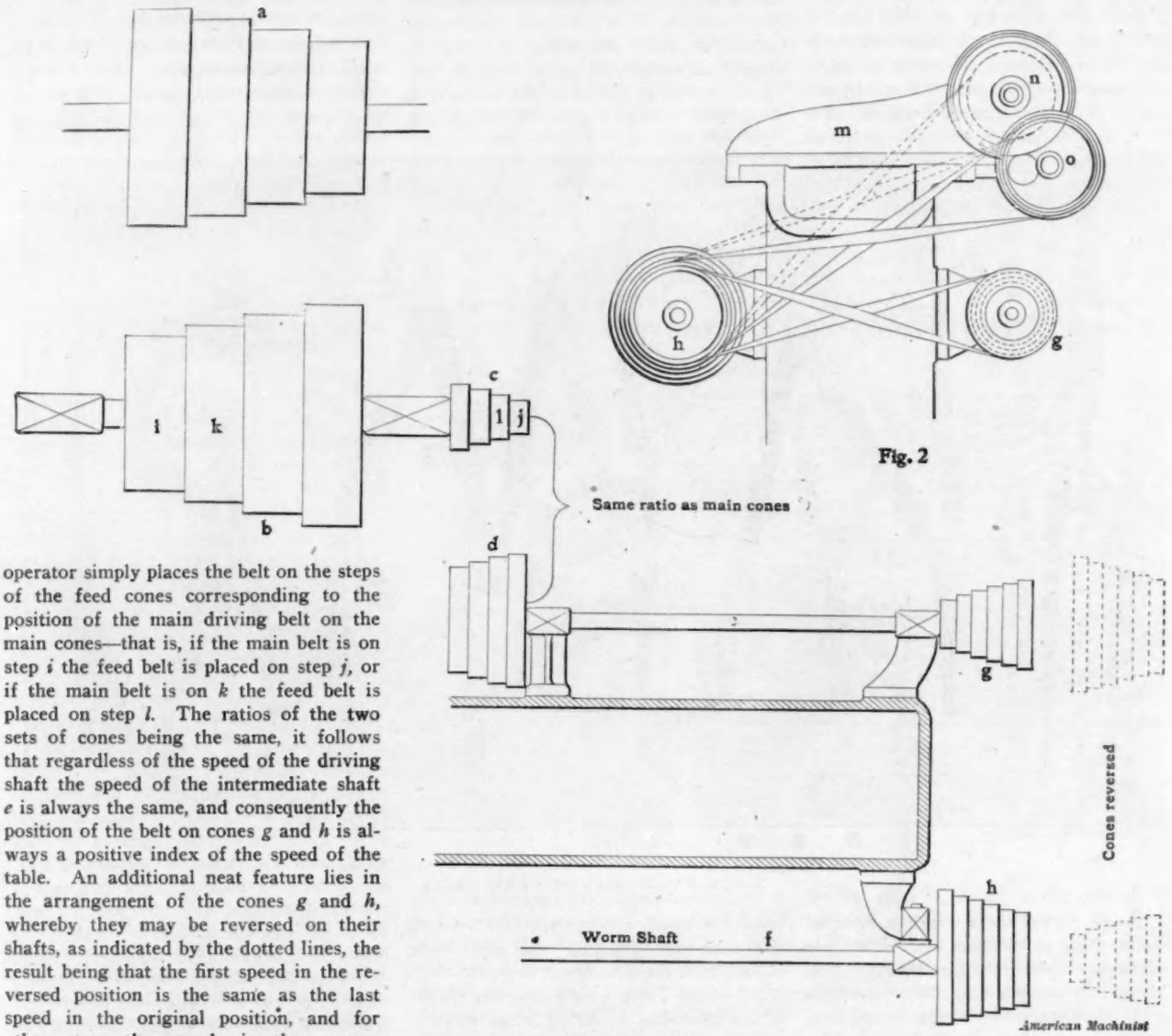


Fig. 2

Fig. 1

MILLING MACHINE FEEDS.

The number of speeds is again compounded by the cones *g* and *h*, the various arrangements giving no less than 320 different rates of feed for the revolving table, suitable for work in a great range of materials as well as in diameter of the work.

A Demand Wanted.

Department of the Interior, United States Patent Office,
Washington, D. C., January 31, 1899.

For several years this office has contemplated publishing a General Index or Alphabetical List of Patentees from 1790 to 1873, which will be a companion to the Subject-Matter Index of Patents for Inventions from 1790 to 1873 hitherto published and which, with the annual indexes published since the latter date, will complete the alphabetical list of all persons who have obtained patents since the foundation of the Government. This index will be in one or two volumes instead of in three, as is the index of inventions now published. The price of this publication will be ten dollars.

Congress has heretofore failed to make the appropriation necessary for the publication. Believing that the necessary appropriation may be had if a sufficient number of copies be ordered, it is requested that those who desire to purchase a copy of this index will notify the office to that effect.

C. H. DUELL,
Commissioner.

A Testing Instrument.

During a recent visit to the shops of the Cincinnati Milling Machine Company I noticed in use a method of testing the alignment of milling machines, which method seems to possess points of interest and value to those who do similar work, since it is capable of giving at least as accurate results as can be obtained by any other method, if not more so, and at the same time it enables these results to be obtained much more quickly than by the usual methods.

In making these tests use is made of an instrument which it will perhaps be best to describe first. This instrument is much used in watch factories, and a view of it is shown in Fig. 1, where in this form it is called a rack and pinion gage. This little machine, which is intended to stand upon a bench, has some resemblance to a drill press; the work to be gaged is, however, simply laid flat upon the platen of the machine and the stem of the measuring instrument brought down upon it by the operator.

The movement of this vertical stem transmits motion to a train of gears inside the case and thus to a delicate steel hand on the outer dial, which dial is graduated to indicate .001 of a millimeter, .001 of an inch, or .025 inch, as may be desired. Reference to Fig. 2 will show the arrangement of the gearing, and it will be seen that a spur gear engages with rack teeth cut in the stem at the left, and this spur gear is attached to a segment which turns the pinion shaft upon which the indicating hand is fixed. From this pinion other wheels are driven which give motion to the small hand seen upon the dial, and which makes one revolution to five revolutions of the larger hand, each figure upon the small dial indicating a complete revolution of the larger hand.

FIG. 1. RACK AND PINION GAGE.

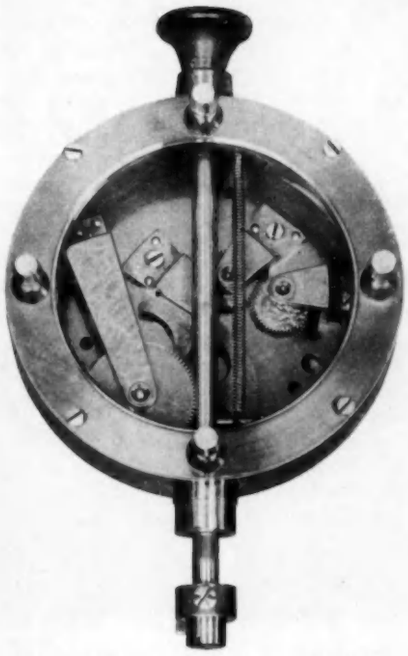


FIG. 2. REAR VIEW OF GAGE WITH COVER REMOVED.

At the top of the instrument are fixed two jaws, one of which is stationary and the other attached to the same stem, so that articles may be gaged by inserting them between these jaws, which come together when the hand indicates zero, and at the same time the stem comes into contact with the plate. The instrument as shown in Figs. 1 and 2 is made by the American Watch Tool Company, of Waltham, Mass.

At Figs. 3 and 4 the method of using the instrument for testing milling machines is shown. In Fig. 3 it is shown mounted upon a block which brings it to the right hight. By rotating the spindle any variation of the arbor or of the hole in the spindle is shown by the movement of the hand on the dial. By sliding the block on the platen of the machine in line with the arbor the variation of the surface of the platen from the machine spindle is shown, and by moving the saddle upon the knee, letting the instrument stand still upon the platen, the alignment of the top of the knee with the spindle is indicated.

This block to which the instrument is attached is so proportioned that when laid down, as shown in Fig. 4, the stem of the gage is level with the center line of the spindle without alteration of the hight of the knee. When thus placed and the saddle moved upon the knee the lateral alignment of the knee with the spindle is indicated; all this being done very quickly, and the actual amount of variation, if any, clearly indicated.

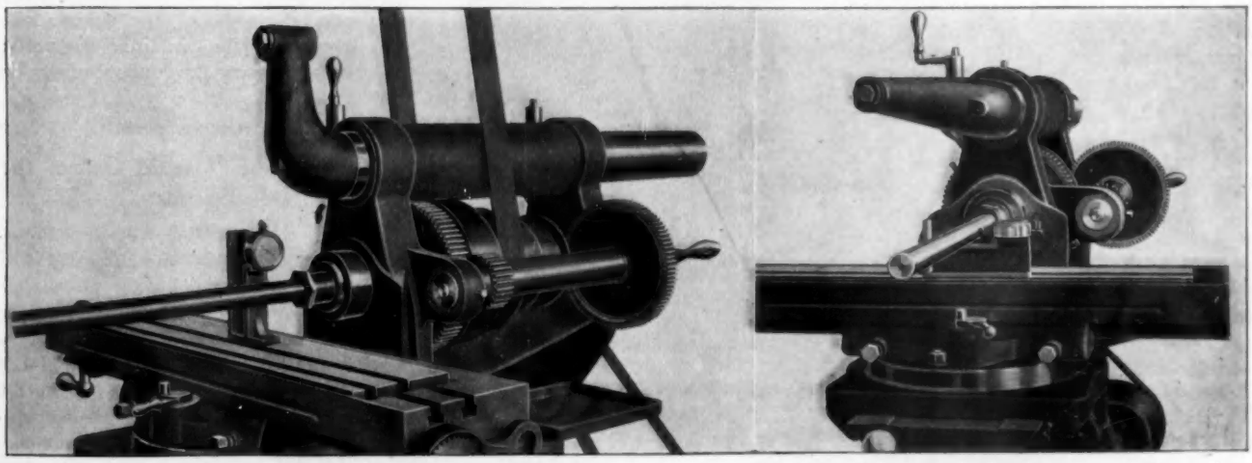


FIG. 3. GAGE APPLIED TO TEST OF VERTICAL ALIGNMENT.

FIG. 4. GAGE APPLIED TO TEST OF LATERAL ALIGNMENT.

The instrument arranged as in Fig. 1 is used also in inspecting certain parts of milling machines, and it is applied to various other tests, one of these being in

connection with the bench centers in the tool room on which all lathe arbors and reamers, especially those with adjustable blades are tested, to see that they are true before going out into the shop.

F. J. M.

Delicate Casting in Iron.

The accompanying half-tones are reproduced from the printed report of the discussion of a paper by Dr. Persifor Fraser, read at the Buffalo meeting of the American Institute of Mining Engineers. The paper referred to gave an account of the casting of a copy of a delicately en-

FIG. 1. CASTING MADE BY MR. GARRETSON OF THE PIN WORN AT THE BUFFALO MEETING, A. I. M. E.

graved medal in common cast iron. Mr. Garretson, of Buffalo, remarked that he did not think the casting exceptionally fine, and that he had frequently made castings equally good. He had, for instance, taken a coin, molded it directly in fine sand, and cast from it in Scotch (or the equally good, if not better, "American Scotch") foundry iron a copy quite as sharp and smooth as the original. The secret is in using very fine sifted sand. In some cases the dust which had accumulated on the overhead beams of the foundry was used after careful sifting.

After the session at which these remarks were made by him, Mr. Garretson cast at his Buffalo foundry, in the presence of a number of members of the Institute, copies of the bronze pin furnished to visiting members by the local committee of the Buffalo meeting. The accompanying illustration, Fig. 1, has been reproduced from a photograph of such a casting, made in green sand, under the conditions of ordinary foundry practice, and not subsequently polished in any way.

In the case of the Kytchtym medal, it was the thin, ribbon-like sprue, rather than the low relief features of the medal itself, which indicated the fluidity of the metal and the sharpness of the casting, so in this work of Mr. Garretson it is the long and slender pin which offers the strongest evidence of these qualities. It is scarcely necessary to point out that the filling in the mold of a long and narrow opening, such as this pin presents, is the severest test that could be imposed upon the casting, and that the sharpness of the point of the pin in the casting is striking evidence of the success with which this test has been met.

The Pittsburgh Testing Laboratory has made for the "American Manufacturer" measurements of this casting and an analysis of the sprue.

The thickness of the main casting is from 0.049 to 0.068 inch. That of the tag bearing the stamped number is 0.024 inch. The analysis, which represents the iron ordinarily employed by Mr. Garretson for thin castings, is as follows:

Combined carbon	0.63
Graphitic "	3.02
Manganese	0.27
Phosphorus	0.482
Sulphur	0.079
Silicon	1.95

Mr. R. W. Raymond, secretary of the society, spoke of the famous castings from Ilsenberg in the Hartz, illustrated in a separate exhibit at the Columbian Exposition, and of the remarkable reproductions in carbonized lace, etc., for which Mr. A. E. Outerbridge, Jr., received the John Scott Medal and Premium. The novelty of Mr. Outerbridge's work consisted in the method by which lace, leaves and other organic fabrics or structures were previously carbonized, before introduction into

FIG. 2. CASTING IN HARD IRON UPON LACE LAID ON SAND.

the molding-flask. The objects were placed in a cast-iron box, the bottom of which was covered with a layer of powdered carbon; then another layer of carbon-dust was sprinkled over them; the box, covered with a close-fitting lid, was heated gradually in an oven, to expel moisture, and the temperature was slowly raised until the escape of blue smoke from under the lid had ceased. The box was then heated white-hot, kept in this condition for two hours, and then removed from the fire and allowed to cool. The fabrics, etc., thus carbonized were not brittle, and could be made white-hot before consuming. In making castings from them they were laid smoothly upon a face of green sand in the mold, and the molten metal was poured upon them. In one case a piece of lace was suspended vertically in the mold, and the molten iron was introduced on both sides of it, so as to rise to a common level. When the casting was cold it was thrown upon the floor of the foundry and separated into two parts, while the lace fell out uninjured, and the pattern

FIG. 3. CASTING IN GREY IRON UPON A PIECE OF THIN SUMMER GOODS WITH MACHINE EMBROIDERY.

was found to be reproduced upon both faces of the casting. The special subject of these remarks is not the remarkable behavior of the carbonized fabrics, but the delicacy with which their details were reproduced, with all the sharpness of electrotypes, in the cast iron. Figs. 2 and 3, which represent the rough castings, will illustrate this point.

The Use of Natural Gas in the Foundry.

BY JOHN RANDOL.

Throughout the oil and natural gas districts great use is made of the gas, which is a very poor illuminant, but a very good heater. In the shops natural gas is used for heating purposes by simply removing the pipes of coal stoves, leaving the door wide open, and placing the gas burner in the base of the stove. Natural gas burns so perfectly and completely as to create little or no perceptible odor. In the better forms of gas stoves the open fires are piped to a chimney, but in the shops the detail of the chimney is omitted; the products of combustion pass directly into the working rooms without any noticeable inconvenience to the workmen. I did not

observe any special industrial use made of the natural gas fire in the machine shop, where it was burned for heating purposes only. In the foundry, however, the jet of natural gas plays quite an important part. It is used for heating purposes and also for special purposes, as shown in Figs. 1 and 2, which were taken from Struthers, Wells & Co.'s foundry at Warren, Pa., where the industrial use of natural gas was introduced by Mr. Robert J. Scott, the present foreman. Fig. 1 shows a portable natural gas jet, consisting of a rubber hose having a burner of ½-inch gas pipe about 4 feet long, which is held in the hands of a workman to skin-dry the interior surface of a green sand mold for a large, light, flanged, cylindrical casting. The gas jet, applied by hand at the precise point where drying is needed, gives excellent results. The mold shown is of such form as to require a nearly uniform hardening of the entire surface, but in many cases it is very advantageous to skin-dry some parts of a green sand mold to a much greater depth than others. In such case the hand-applied jet gives the results required. The workman dries each part of the mold to the required degree of hardness, judging of the effect of the gas jet on the sand by pressing the surface of the mold with his fingers from time to time.

Where large surfaces somewhere near flat are to be skin-dried it is the practice to cover the mold with sheets of corrugated iron, laid on blocks so as to leave a clear space of three or four inches between the face of the mold and the covering. One or more burners of the form shown in Fig. 1 are then applied so as to force the flame in between the surface of the mold and the covering; this procedure dries the mold and at the same time heats the iron covering, so that, as the gas jet is moved around, the skin-drying of the mold is effected not only by the direct heat of the burning gas jet, but by the heat radiated from the covering. This gives a much more rapid drying effect on large surfaces than if an attempt was made to skin-dry the surface of the uncovered mold by means of the unaided gas flame.

There is really a very great advantage in skin-drying large molds by means of a gas jet applied as shown. It is always a matter of some risk to move a mold which requires skin-drying from the molding floor to the core oven, and it always requires more time and care to put up a mold which is to be moved before pouring than to make one which is not to be moved. Where a handy gas jet is available a much larger percentage of the molds in the foundry is skin-dried than would be the case if every mold had to go to the core oven, or to be skin-dried, as is sometimes done, by the use of an open brazier of charcoal, or even in some cases by a fire of shavings built on the surface of the mold.

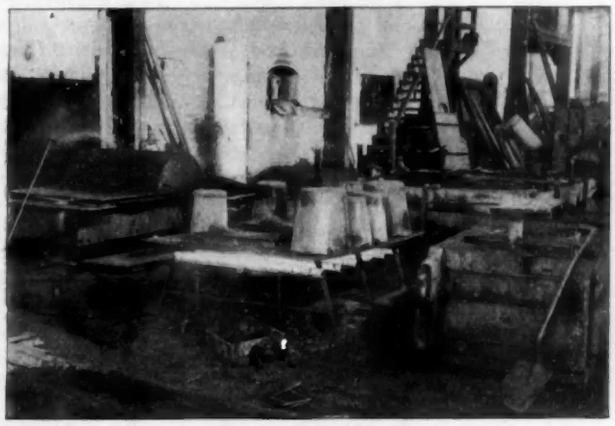


FIG. 1. SKIN-DRYING A GREEN SAND MOLD WITH NATURAL GAS FLAME.

FIG. 2. HOT TABLE FOR DRYING LADLES AND CORES, HEATED BY NATURAL GAS.

In Struthers, Wells & Co.'s foundry, which is extremely well equipped in every particular, the heavy floor being covered by a five-ton traveling crane, while the light floor is covered by pneumatic hoists, two hot tables are used, one of which is shown in Fig. 2. These tables are in almost constant use throughout the day for one purpose or another. They are available for core drying, or for skin-drying small copes, and they are also very convenient for drying ladle linings. Fig. 2 is from a photograph taken about 3 o'clock in the afternoon, and shows a lot of ladles turned bottom side up on top of the hot table to dry the inside daubing. These tables have their tops made of ¼-inch boiler iron, supported on legs of pipe. The gas burner consists of one lengthwise pipe having six cross pipes of similar diameter screwed into it, so distributed as to nearly cover the entire bottom of the table with the flame of gas jets proceeding from numerous small holes drilled in the tops of the cross pipes. This is very far in advance of the old method of drying the lining of each ladle by building a fire in it, both in point of convenience and cost. It seems quite likely that even in localities where natural gas is not available, producer gas-heated tables of the description shown might be introduced with economy. They are certainly a very great foundry convenience, and both the hot table and the movable gas burner are efficient aids in the production of good work at reduced cost.

A Proposed American Exposition in Russia.

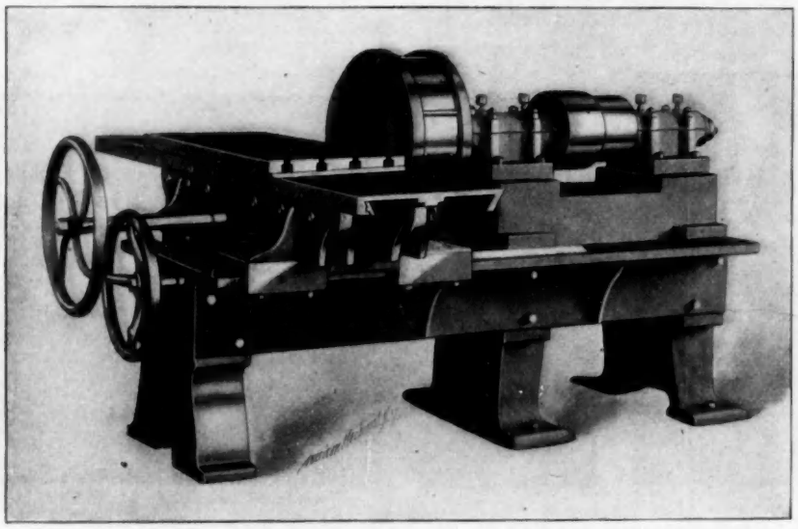
Recent advices state that our diplomatic officers at St. Petersburg, Russia, have been consulting American residents of that city and Moscow, as well as American manufacturers who have visited the Russian capital during the past year, as to the advantages to be derived from an American exposition to be held in St. Petersburg in 1901, immediately following the Paris Exposition, as the best method of introducing and advertising goods and affording American manufacturers an opportunity to become acquainted with Russian merchants and familiarize themselves with the kind of goods adapted to that market and the methods of doing business. Such an exposition, it is pointed out, would result in the establishment of a Russo-American bank to handle American business, a commercial agency to report on the standing of business men in both countries, as well as an international express company and parcels post—all of which are essential to the proper development of trade with that rapidly growing country. Russia offers to the keen American manufacturer the same opportunities the United States offered seventy years ago, with the additional advantage of a large resident population very friendly to American wares. This being the case, no better opportunity for the introduction of our manufactures could be afforded than the proposed exposition.

A. F. TENNILLE.

Surfacing and Joint Grinder.

We give herewith a general view of a machine designed for manufacturing operations in which it is desired to produce fairly straight, true surfaces, the work being either secured direct to the table or in a fixture arranged for that purpose, the top of the platen being supplied with T-slots for that purpose.

As will be seen, the machine consists essentially of a heavy headstock in which is mounted a spindle carrying at its outer end a ring wheel which is held in a suitable chuck. On the bed of the machine is mounted also a carriage, which can be moved along the bed by the lower one of the two hand-wheels shown for adjustment, and upon this carriage is placed the platen, which has a transverse movement by means of the upper hand-wheel and a rack and pinion. The platen rests upon anti-friction rolls, as shown, and is also gibbed to the carriage.



SURFACING AND JOINT GRINDER.

The bearings are of an improved self-oiling form, the rear box being arranged to take up all end thrust, and both bearings being 3 inches diameter and 12 inches long. The table is 78 inches long, that portion of it having the T-slots being 38 inches long. It is designed with this machine to finish such work as small slide-valves, keys, straps and the joints of plow mold boards, and in fact a variety of similar work in which straight, plain surfaces are desired. The machine is made by the Safety Emery Wheel Company, Springfield, Ohio.

It is stated that the British Admiralty has ascertained that the shipbuilding facilities of the United Kingdom are sufficient to replace the entire British navy, 1,500,000 tons in two years, and if so then of course they could duplicate it in the same time, which fact is very significant and means much to other European nations.

The Large Foreign Trade in Locomotives—Rapid Production.

At a recent meeting of the Midland (England) Railway Company the statement was made that the reason why the company had ordered engines in America was that it could not get them in England. At the time of the meeting the company had 170 engines ordered in England. The orders for these began in December, 1897, and if the engines had been delivered as promptly as was expected the company would then have had forty-eight of them in service. Not one, however, had been delivered. The last order given by the company for construction in England was in December, 1898, for twenty engines. It was impossible to obtain a promise of an engine inside of fifteen months' time. One of the directors stated that there was simply no help for the company but to order in America. The company must handle its traffic, and, if it could not obtain engines in England, he said, it must look for them elsewhere. It would be interesting, he continued, to know what part the engineering strike had in piling up arrears and putting back the clock in the British engineering industry.

While this difficulty of obtaining engines has had much to do with directing business to this country, there have been contributing causes. The study of American railway practice in England and some of the nations on the continent has been gradually attracting attention to American methods and factories, and has induced the companies to make the experiment of American locomotives.

Early in 1898 a significant order was received by the Baldwin Locomotive Works. It was from the English War Office, and was for three locomotives of the ordinary passenger type, narrow gage, for use on the Soudan Military Railway. This was supplemented by a call for a fourth. The order for the first three was placed January 4, and the agreement was that the engines were to be ready for shipment by February 26, which would have given the company fifty-three days on the first three engines and less than fifty on the fourth. This was considered a very short time for the work, yet the locomotives were practically finished and ready for shipment on the 1st of February, and were shipped from the factory February 9, being held only until the arrival of an English inspector, in order that he might look them over. The engines were shipped from New York to Alexandria on the Stalheim much within the specified time. They were only thirty days in process of construction.

Following this order came one for the Egyptian Government railways for twenty freight locomotives. Of these fifteen were ordered February 28 and were shipped April 27. Five more were ordered April 4, and left the works June 2. Since that time three more engines have been built for the Soudan Railway.

The recent orders for the Midland Company are equally significant. These are for thirty locomotives on the Mogul pattern for freight service, built according to American practice as to design, but having copper fireboxes and copper flues, in accordance with English practice. Of these engines ten were ordered December 17, ten on February 16 and ten on February 25. Work is now in hand on all thirty, and is being inspected by John W. Smith, of the Midland Railway. Another large foreign order was for seventy-one engines for the Chinese Eastern Railway, all of consolidation type for freight service, built on the Vauclain compound system.

One of the questions advanced by the French Commissioners who placed the order for ten engines for the French State Railway was as to the comparative consumption of coal by American and European locomotives. Mr. Boell, who was at the head of the French Commission, said that this is a question which can be determined only by careful comparative tests. This, he said, is a matter of much importance in Europe, where the cost of fuel is greater than in America. For himself, he believes that the American engine uses the greater quantity of fuel, but he gave evidence of a desire to see the question fairly and fully settled.

A gentleman who is experienced in these matters said yesterday that it is undoubtedly a fact that the locomotives in this country use a greater amount of fuel than those in use in Europe. In America, he said, the locomotives haul double the loads hauled in Europe, and the consumption of coal is governed by the load. He believed that a false impression has been given by statistics that show the number of pounds of fuel used by an engine in running a mile, and that do not show also the tonnage hauled.—"Philadelphia Ledger."

Letters from Practical Men.

Cheaper Than a Compound Die.

Editor American Machinist:

As one interested in Mr. W. A. Warman's "Making a Compound Die," in issue of March 9, I beg to say that while no toolmaker can fail to appreciate the excellent practice and design brought out in Mr. Warman's article, it seems to me to involve an unnecessary amount of accurate work, and that the common solid die answers every purpose at a very much less first cost, and I think, also less for renewals.

If any considerable quantity of disks are to be punched, frequent grinding is necessary, and as (for electrical reasons) it is desirable to leave the oxide on the sheet iron this wears the die very fast and makes renewals come often.

We make a die in the cheapest way, as we find after punching some ten or twelve tons of these disks (they are 2¼ inches in diameter, instead of 1½ inches) that it must be thrown away after punching from 50,000 to 75,000 disks.

We use a cutter blank 3½ inches diameter, 1 inch thick, bore out the center to the diameter between the inner points of the "teeth," put it on a mandrel and face it up, and turn to fit the die holder, which is recessed ¼ inch. It is held in the holder by two screws and two dowels, put up through the bottom. The punch is milled and finished first, being 1½ inches long and fluted straight its whole length. The die is laid off from this and then slotted to the line, leaving enough to shave out by forcing the punch through. We then back it off to a line ¼ inch from the top, leaving the top part straight.

We find this die convenient, quickly made, and easy to grind, as it can be taken from the holder and put in a chuck, faced up and returned to its place without disturbing the press. We use a stripper similar to that described by Mr. Warman, but made of mitis steel. We do not use a knockout, but punch the disks through the die. We harden punch and die and draw to straw color.

GEO. C. TOWLE.

[It must be remarked that our correspondent makes no provision for punching the holes in the centers of the disks, as in those made by Mr. Warman.—Ed.]

A Handy Tool Holder.

Editor American Machinist:

I am by no means sure that so simple a tool holder as the one shown in the sketch will be thought worthy of illustration in the pages of the "American Machinist." I bought the first one I owned, together with several tools to fit it, from an excellent tool maker, James Latta, several years ago in Waterbury, Conn. My excuse for offering it for illustration is that, while I have always found it in demand in shops that I have worked in, and there have been many that have copied it, I have never found one that was not a copy from the one I have. The tools of round steel are held solid in the V-groove by the tool-post screw of the lathe or other machine tool the holder is used in.

I have found the holder very useful on a planer or shaper, with a tool for putting in small key-seats, but used for that purpose I find that I can take a much heavier cut by putting the tool itself against the clapper block, with the tool-post screw at the back of the holder; this makes it less liable to chatter. The set screw in the swinging yoke at the front of the holder clamps the tool bar and stiffens it for the cut to a degree that can only be appreciated by one who has used the rig. An angle for the V-groove of about 70 degrees, and a holder with a yoke that will take in ½-inch round stock, makes a handy size.

An instance of its use: I was putting new combination locks on the vault doors of a country bank. The spindles or shafts to which the lock dials were fastened were built into the doors. They had a collar on them at the center of their length, and the plates of the doors were riveted and screwed together after the spindles were in their places; so the new dials must be fitted to the old spindles. The worst part was to make new key-ways in the dials to match the ones in the spindle. The holes and spindles were 5-16 inch in diameter, and as there was no metal wasted in the castings when the dials were made, and they were all finished and nickeled and would stand no banging around, it looked like a mean job. I found a bicycle repair shop in the place that had a lathe with a slide rest, and making a tool like Fig. 2 I pulled those key-ways through, Morton shaper style, in less than an hour for two dials, with the dials clamped on to the face plate. The holes in the dials were 1½ inches deep, but the clamping of the small bar so near the end of the holder stopped all trouble from springing.

In another case I had a lot of small hollow mills to make. The shop had no miller or any means to cut the teeth, except by using a file. I turned one end of a piece of planished rod to fit the holes in the back of the mills. Putting the rod in the holder, I fastened one of the lathe gears to the other end of the rod with a split bushing of cast iron and a wedge in the key-way of the gear; then laying the holder flatways on the tool block and clamping it with a tool in the tool post, I used the gear teeth for an index, measuring with a piece of wire from the carriage to the teeth, and using a cutter in the lathe centers.

FLORIN.

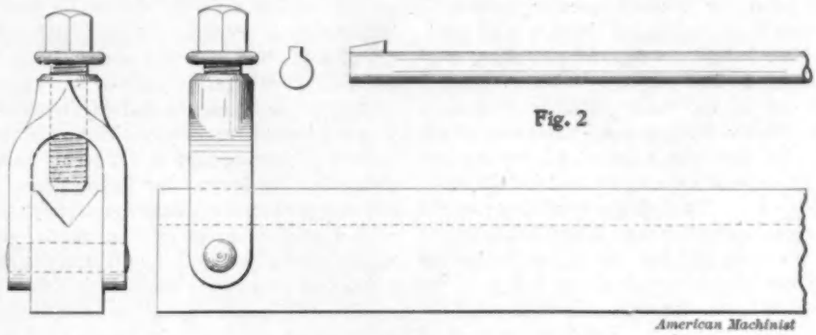


Fig. 2

Fig. 1

A HANDY TOOL HOLDER.

Shrinking Ferrules on Long Rods.

Editor American Machinist:

In your issue of February 9 W. F. M. (Questions and Answers, No. 13) takes a very roundabout way to shrink his ferrules on a rod. If he will discard the idea of using a press, and instead, make a pair of tongs like the sketch he should have no trouble. The tongs have heavy jaws that can be heated, and when grasping the work will retain the heat long enough to give ample time for placing. The jaws are shown with a hole a little larger than the rod upon which the piece is to be shrunk, and this hole is counterbored for nearly its entire length to the size of the outside of the ferrule, leaving a shoulder which will prevent the ferrule from sliding endwise in the jaws when being slipped over the rod. No appreciable force should be required to get the ferrule into place. Two or more pairs of tongs might be necessary if he has much of this work to do, so that he need not be delayed by the heating of the tongs.

FREDERICK M. BUSH.

Worcester, Mass.

The Possible Advantage of the Motor Over the Horse.

Editor American Machinist:

There is probably no topic of greater mechanical interest in these days than that of the propulsion of vehicles upon common roads, and it is therefore permissible, if not, indeed, desirable and necessary, to keep up the talk on the subject. Someone sometimes says something. In the discussions which we have had of the horse as a

motor in comparison with the mechanical motors, it has been made to appear that the horse has some advantage over the motor in the greater pull that he is able to exert in starting the load and in getting up to speed. The motor is able to exert only a uniform pull, or a pull, at best, of limited range of variation, and which cannot be exceeded in any emergency, while the pull of the animal in starting from rest and at slow speeds is much greater than when under full headway. In consequence of this, when a motor is provided which is of ample power for the regular propulsion of the vehicle at any practicable speed, it is still necessary to provide a much more powerful motor in order to have sufficient available force for starting the vehicle and for getting it up to speed. A one-horse motor is notoriously insufficient for doing the work which one horse would do in drawing any kind of a truck or wagon. Probably, under the usual arrangements, not less than a four-horse motor would be at all times sufficient to take the place of one horse. Indeed, in the case of street cars, experience has shown the advisability of providing a much greater excess of power than this, and at times it is all used.

How I fetch up against this thing may perhaps be best shown by a little rehearsal of one of the many schemes that keep continually chasing me. Compressed air is just now much talked of for surface traction, and we may as well indulge in a little of it, although the conditions would be practically the same if any other motor was employed. Say, then, that we get up an automobile carriage or sulky to be driven by compressed air, supplying the air to the motor at a constant pressure of 100 pounds, gage. Whether or not the air was reheated would make no difference, except as to the length of run per charge of air. Say that the vehicle weighs, including your humble servant for a load, 500 pounds, and that we are to do our running upon good asphalted streets at 12 miles an hour, and that the motor is designed to do its most economical working at that gait. The actual pull in the sulky (or in the case of the motor it would be better to say thrust) to keep it going, under the above conditions, would be at the rate, say, of 30 pounds per ton, or only 7½ pounds, and the horse-power would be $5{,}280 \times 12 \times 7\frac{1}{2} \div 60 \div 33{,}000 = .24$, or, say, one-quarter of a horse-power. The motor cylinders should be of such a size that with the air at 100 pounds pressure the cut-off would occur at one-quarter stroke, and the mean effective pressure per stroke would be 44 pounds. To increase the thrust of the motor upon the sulky at any time the air might be admitted at the full pressure of 100 pounds for the full stroke, when the thrust would become $44 : 100 :: 7\frac{1}{2} : 17$ pounds. This would be the greatest thrust that it would be possible for the motor to exert upon the vehicle, no matter at what speed it might be moving. The thrust would be no greater at one-quarter of a mile an hour than it would be at full speed; and that shows us where the motor, as commonly arranged, is at a disadvantage in comparison with a horse, and why it is so necessary to provide a much larger motor.

But now say that, with the motor running at normal speed, as when propelling the sulky at 12 miles an hour, the ratio of the gearing was so changed that the actual motion of the sulky was only one mile an hour; it is evident that then the thrust of the motor would be twelve times as great as before. Instead of being 7½ pounds it would be 90 pounds, or, with the full pressure of the steam for the full stroke, it would be 204 pounds. This for a one-quarter horse-power motor would be something that it would not be easy to be ashamed of, and a full horse-power motor ought to be able to make a horse faint away.

It is very evident that what is needed for the satisfactory solution of the traction problem is not the increase of the power of the motors, but the appliances for making the power available. A motor with a fixed ratio of rotation to that of the wheels of the vehicle must of course be much larger than is properly required, and cannot give the best economy under any conditions. A changeable ratio of movement of the vehicle wheels to that of the motor is an absolute necessity. There is no system of gearing that as yet seems to be altogether satisfactory for the purpose. A positive motion, immediately variable drive, with a great range of relative speeds, and which never lets go its pull in changing from one speed to another, is what is wanted. It is easy enough to provide first a normal gearing, for full-speed running, and then another 4 to 1, and a third, say, 12 to 1, with clutches to throw either one in or out; but something better than this is required, for the changing from the one speed ratio to the other is always accompanied with knock or shock, with the necessity of stopping or slowing the motor, and consequent loss of effect just when it is most needed. But even existing contrivances for changing the relative speeds are much better than none at all, and their adoption until better things are devised is imperative. Whatever style of motor is employed, the horse must not be allowed to monopolize the range of possible efficiency, for it should be greater with the motor. At high speeds the motor, even now, has greatly the advantage, and it is equally possible to have it also at low speeds, and to have both possibilities combined in the same vehicle.

TECUMSEH SWIFT.

Miscellaneous Shop Uses of the Welding Transformer.

Editor American Machinist:

The transformer which was described in the two articles over my signature appearing in the "American Machinist" of January 26 and February 9, can be used for a number of other purposes, some of which may be interesting to your readers, and I have therefore taken opportunity to briefly make note of them.

In general it may be said that the transformer is applicable to any method of mechanical manipulation in which it is necessary to apply heat to masses of metal, and therefore the processes of annealing, brazing, soldering and the like come under its scope. For instance, the shank of a tap may be annealed very prettily in the following manner: A block of copper is drilled to the proper size, and the hole is tapped by the tap which is to be annealed. This block is clamped in one terminal of the transformer, and suitable connections are made from the shank of the tap to the other terminal. The current is then turned on. In this way the teeth of the tap are practically imbedded in solid copper, and are the last part of the tool to heat up. The color drawn on the tool may be a very deep straw, deeper than is common in tap work, because by this method the annealing process will be carried closer up to the teeth, while the teeth themselves remain quite hard. The advantage of this is very apparent, because the brittleness is taken from every part of the tap except the teeth, rendering it very much less likely to break, but in no way impairing its cutting qualities.

A similar process may be applied to anneal the shanks of reamers. A small die may be very prettily annealed by screwing it upon a thick copper rod which is capable of conducting away any heat which may be formed in the teeth themselves, and then passing the current directly over the die from edge to edge. If the work is properly done, the manipulator will note that the color will come up beginning at the outer edge, and lastly appear in the proximity of the copper rod, and it of course follows that the grade of hardness shades from the teeth to the outer contour of the die—a very desirable condition, but one impossible to obtain by any other means.

Again, it may be desirable to anneal a hardened plate locally for the purpose of drilling or tapping. Two terminals of the welding transformer may be pressed upon the spots to be annealed with a contact which is moderately poor electrically. When the current is passed through, great heat will concentrate at these spots. They may even be red-hot while the surrounding metal is comparatively cool. This process will be found useful by machinists in softening their circular saws for cutting metal, for the purpose of securing them to a face-plate or threading them upon a keyed arbor, and scores of other cases of local annealing might be mentioned.

Brazing is best effected by passing the current directly through the joint to be brazed. The heat will concentrate there, while the rest of the work will remain comparatively cool. The advantage of the

use of electricity obtains in the fact that the work is not likely to become burned by the great heat, and as the work can be seen more readily, the manipulator can assure himself that the metal flows in all places where it is necessary—a matter of more difficulty with a charcoal furnace and blast lamp.

In soldering, the transformer will also be found useful. A convenient method to employ in small work consists in clamping across the jaws of the transformer a thin plate of German silver, bending it in such shape as to form a little table upon which the work can be placed. This table can be made very hot, and will transfer the heat to the work by simple conduction. This leaves both hands free to manipulate the work, which, when placed in the proper position, can be readily cooled by simply cutting off the current. It is not advisable to use a massive plate for this purpose, for it is not necessary to store the heat, as is the case with soldering iron, but rather to generate the heat and use it as fast as generated.

Soldering may also be performed in the same manner as brazing—that is, by passing the current through the joint to be soldered. In this way only the joint to be operated upon will heat, and if the work is done in an ordinary amount of time, any other joints which the work may carry will not become unsoldered. This will enable the operator to do complicated soldering which has heretofore been more difficult.

The transformer can also be advantageously applied to the case-hardening by means of prussiate of potash, for the surfaces are easily treated with the chemical, and the heat in the metal is under absolute control at all times.

GEO. T. HANCHETT.

Boring Tool Holders—Some Odd Lathe Jobs.

Editor American Machinist:

While a number of boring-tool holders have been described in your columns, I have not as yet seen anything quite like

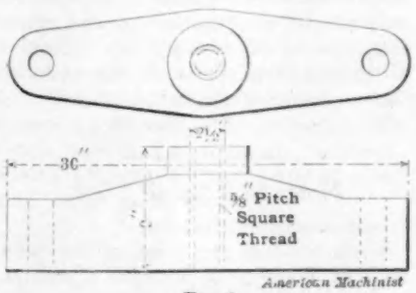


Fig. 1

A LATHE JOB.

one I have been using with much satisfaction for the past ten years. I made the first one to hold a bar, to bore and chase out a casting as shown in Fig. 1, after I found that I could not hold it with the regular single-screw tool-post. The job was done on a 30-inch lathe. After thinking over the matter, I had a pattern made for a holder like the one shown in Fig. 2, which I think explains itself. It is cheap to make, the only finish being to plane the tongue and surface where it fits the cross-slide; drill and tap two set-screw holes, and drill the hole for the clamping bolt.

I also enclose drawing, Fig. 3, of holder to be used in tool-post, for small tools. In

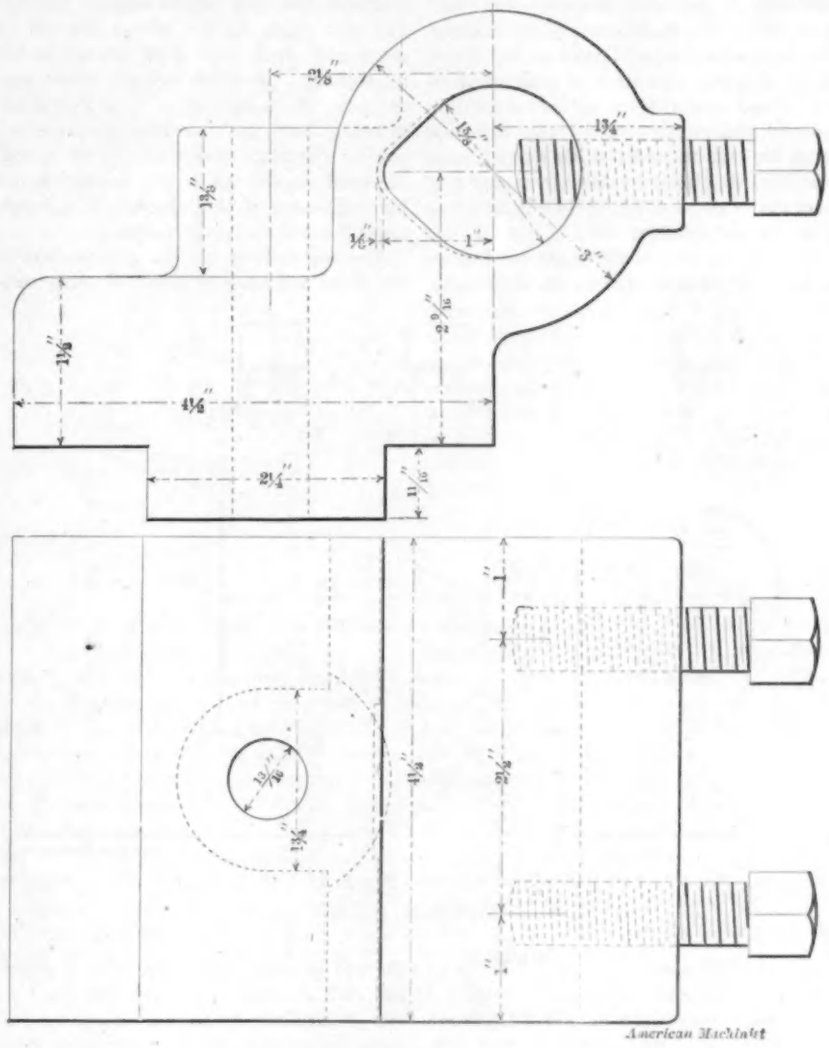


Fig. 2

HOLDER FOR LARGE BORING TOOLS.

fitting up it is well to first drill and tap the two set-screw holes and put in the screws, then clamp a true bar in the holder, and set the shank for planing, by the bar. This insures the boring bars being held in line with the spindle, and allows the largest bar to be used which will pass freely through the hole to be bored. The center of the opening where bar is held should be the same hight as the centers of the lathe, and it will be seen that, no matter what the diameter of the bar may be, it will always be held at the proper hight. I have one for each of my larger lathes, and find them almost indispensable.

About seven years ago I had another job somewhat similar, but much larger, being 4 feet long and having a square thread 3 inches diameter and ¾-inch pitch. It was clamped to the carriage of a 20-inch lathe. A bar with a hole near the center for the cutter (which was held in place by a set screw at the side) was put on the centers. After boring to size, a chasing tool was inserted, a cut run through, and the lathe stopped with tool point uppermost. The tail center was then withdrawn, and that end of bar dropped so tool would clear the bore. The carriage was then run back by hand, the nut closed on lead screw, tool set out, bar replaced on centers, and another cut run through. This was repeated until the thread was finished, and it made a good job.

About two weeks ago I fitted up a large cast-iron tank, shaped like a plug hat. The crown was 36 inches diameter and 48 inches high, the rim 43 inches diameter. In one side near the rim a hole was bored and chased with straight thread to fit a 4-inch pipe, long screw. The casting was clamped on the carriage of a 24-inch lathe, rim down, and a bar having a hole near the

end for the tool, and set screw to hold it, was held in a chuck on the lathe spindle. After boring to size, a chasing tool was put in the bar and a cut run through; then tool was loosened by reaching up inside and turning the screw, tool slipped back, carriage returned by hand, tool reset by measurement, nut closed on lead screw, and another cut taken. This was repeated, and the thread was finished in a satisfactory manner. Manifolds 4 feet long have been chased out with the same bar, but clamped to the cross-slide. The chasing was done as follows: Tool was set, a cut taken through, lathe stopped with point of tool to one side, cross-slide moved so tool point would clear, carriage run back by hand, tool set out, cross-slide moved back to a stop, nut closed on lead screw, and another cut taken, and this cycle repeated until thread was finished.

Not having seen these plans used elsewhere, I trust they will be of interest to some of your many readers. With possibly ten or twelve exceptions, I believe I have read every issue of the "American Machinist" from its foundation, and with much profit. WM. HOLLINGSWORTH.

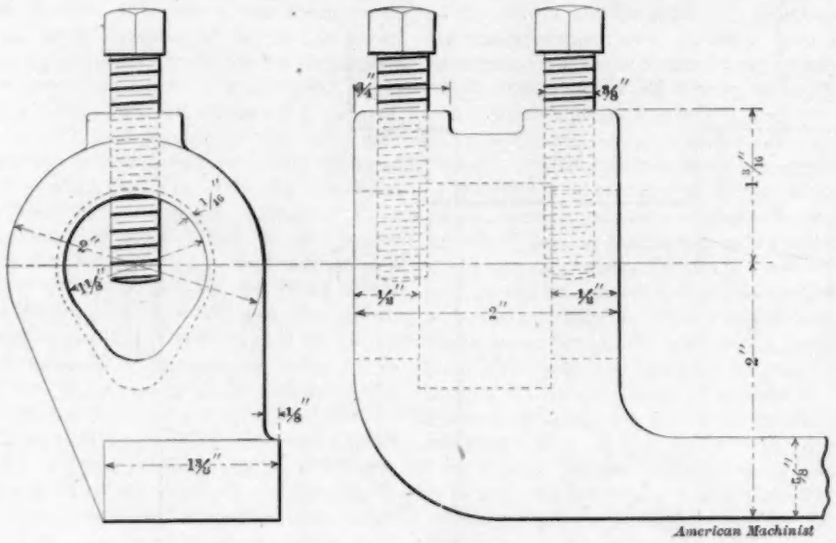


Fig. 3

HOLDER FOR SMALL BORING TOOLS.

A Clipping Cabinet.

Editor American Machinist:

The scrap book was discarded years ago and then came letter files of the accordion type, which expand like the stock of some of the new air-power companies. This was supplemented by a series of "data cards," on which were pasted rules, tables and data likely to be useful in making calculations or for reference. These were manilla cards, about 6x9 inches, although not quite standard size.

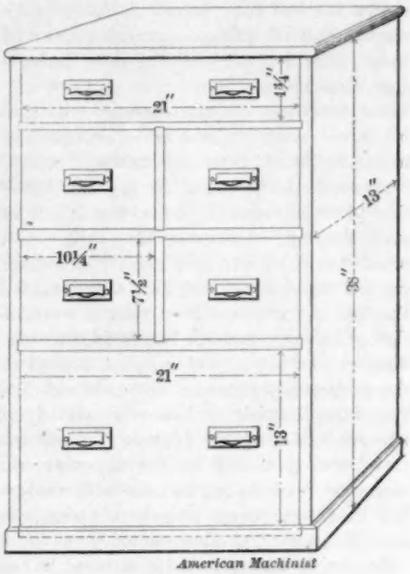
This was before I became acquainted with the card system which I have since used for many purposes. The card idea seemed the right one, and so the clipping cabinet began to grow—on paper. About this time Mr. Halsey's article on filing clippings appeared, and was of great interest to me, as it came very close to my own scheme.

The cabinet is plainly shown in the sketch, and consists of one drawer 21 inches wide by 13 inches deep, four drawers 7½ by 10¼ inches, and one drawer 21 by 4¾ inches. The four drawers measure 7x9¼ inches inside, and accommodate 6x9 pages without folding, and also room for the tab on the top of the guide card. The large drawer is for photographs of locomotives or other machinery, which cannot be folded without injuring them, and for drawings or other similar clippings which are to be saved. A board against the prints, similar to the binding board of Mr. Halsey's b x, keeps them flat and in small compass.

The top drawer has six grooves cut in the front and back to allow of being subdivided in almost any way. Three standard card drawers can be thus obtained, or the drawer can be used as a one or two card drawer, and the rest for other uses. These card drawers can be at either end or in the center. At present this is being used mostly for keeping film negatives. These are put in stout manilla envelopes, and by being pressed together they stay flat and are easily get-at-able. They will be used for regular card purposes later—indexing books or the like.

The drawers are made with ½-inch sides and backs, ⅞-inch front, and 5-16 inch bottoms, let into the sides, front and back to avoid nailing. The sides, top, bottom and two of the drawer supports are also of ⅞-inch stuff, and there is a ½-inch strip around the base for a finish.

The drawers all have sheet-brass handles, in which the center is cut out to receive labels indicating the contents of the drawer, and part of this center forms the pull. They can be had at any good hardware store. The sides of the drawers are cut down about an inch to allow easy handling of the contents, same as in all card drawers.



A FILING CABINET.

When it comes to filing, there is little difference from Mr. Halsey's, except in the use of envelopes for most clippings. The only exception to this is where pamphlets are filed, and these can just as well go in envelopes. Guide cards give the main headings, such as "Boilers," "Steam Engines," "Locomotives"; while the subdivisions are marked on the envelopes, as "Grates," "Material," "Tests," etc. The guide card with guide in center is used for the main subject, such as "Locomotives," while if subdivisions are necessary side guides are used, alternating as to side. This keeps the guide-card tabs far enough apart to avoid hiding each other, and they are quite readily seen—especially as the drawer fills up. When any information on a subject is wanted, the envelope contains all that you have concerning it. For the present this seems to answer all requirements, and ought to hold all the clippings for several years. This may be only a step in the evolution of clipping-filing, and I am always looking out for new ideas on the subject.

FRED H. COLVIN.

Notes in a Small Shop.

Editor American Machinist:

While visiting the shops of the New Bedford Foundry & Machine Company, of New Bedford, Mass., I was interested in some of their methods and work. A large part of their business is repairing and furnishing machinery parts to the cotton mills in the vicinity. They try to take care of any job which can be taken through the doors. The engine which furnishes power for the shop, as well as

for several tenants, is one of the old box-bed affairs, with the cylinder and pillow block bolted to the bed, and having the crosshead guides mounted on turned columns. It turns over 50 revolutions per minute, with a load of about 50 horse-power. Both engine and boiler are in the same room, so that besides the usual amount of oil the engine is effectively lubricated with occasional deposits of dust. This dust wore out composition gibs every few months, and for experiment Mr. Besse, the manager, tried ordinary red fiber in place of the metal gibs. The last pair were planed down 3-16 inch and fiber strips attached. This was tried three years ago and measurements made a few weeks since showed no appreciable wear. The guides are in fine condition, and at least one man swears by fiber for such conditions.

One is struck by the difference between the shaper of to-day and that of a past generation by seeing in this shop two shapers made long ago by Eberhardt Brothers, of Newark, N. J. The light open-work frame is in marked contrast to the heavy box base with which we are now familiar.

A large coal concern in the neighborhood uses a stationary engine fitted with two drums, or "nigger heads," for hauling and switching the cars. This engine runs constantly and has at times to haul twenty or thirty loaded cars. To stop them the ropes are thrown off the heads and the engine runs wild. As the latter is under 120 pounds initial pressure, and about 500 feet away from the boiler, one can imagine the conditions under which it has to work. Nothing in the market stands the trouble for more than a few months. Mr. Besse has designed, and is now putting through, an engine for this work, a 10x8-inch double engine, with about three or four times the weight ordinarily put into such a machine. One can't help the impression that its own weight will be sufficient to anchor it without further fastening. The result desired is to get up an engine to stand the abuse of brute force and ignorance.

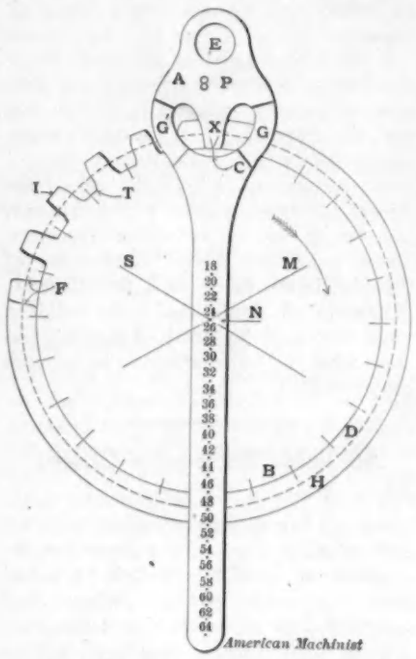
For chucking purposes this concern uses the three-lipped twist drill to follow cored holes. To start the drill they chamfer the hole to the angle of the cutting lip with a tool resembling a side tool, but having excessive clearance. This gives the drill a true start and it bores the hole sufficiently accurate, in the majority of cases, for a reamer to follow.

WM. SANGSTER.

A Template for Drawing Gear Teeth.

Editor American Machinist:

While making a set of drawings not long ago, I found myself confronted with a train of spur gears of different sizes to lay out and ink in. The laying out was all right, for I did it in the usual way, but wishing to have the drawings look realistic, I did not like the idea of having the gears represented by a center, pitch and outside diameter line, with a few teeth marked where they engage, so I concluded I would make every tooth in the gears, and do it in short order. Taking a piece of engravers' bristol board, which is stiff and thin, and cutting it into a convenient



A TEMPLATE FOR DRAWING GEAR TEETH.

shape, somewhat like template marked *A* in the illustration, I laid out part *X*, which is the shape of a gear cutter, 8P., and cutting out an opening around it with the point of my eraser and marking off the distance from *N* to *X* (pitch line), which was 12-8, and placing the template over the drawing, I proceeded to ink in the teeth, which I accomplished in a surprisingly short time with perfect accuracy. For example, we take the gear being drawn in the illustration, which is 8P., twenty-four teeth; the distance from pitch line *D* to center of gear, where lines *S* and *M* cross, is 12-8, marked 24N, sticking a pin through a pin hole in the template at the crossing of lines *S* and *M* to act as a pivot, and having marked off the depth of circle *B* into twenty-four spaces, I placed a finger in the hole *E* and set the template so as to have the arrow-point under *X* correspond with mark *C*. Then with a pen I marked the engaging sides of teeth *F*, using pencil lines *H* and *B* to guide length of stroke of pen. Continuing this operation until the template had made the complete circle, I inked the tops and bottoms, *I* and *T*, of the teeth with compass, which completed the gear.

By the use of this simple little device I have saved no end of work with the compass. These templates could be stamped out of sheet steel and be made very accurate with the parts *G* and *G'* raised 1-32 inch to allow the inked part of the drawing to pass under without being rubbed or blotted, also a line of pin holes laid off ⅛ inch apart, or whatever pitch is used, and numbered according to the arc that they allow part *X* to travel in. For instance, pin hole No. 24 is for a gear of twenty-four teeth, and No. 30 for a gear of thirty teeth, and so on.

As a draftsman I suggest this to a manufacturer, who, with a press could make them in various pitches to be sold in sets, and would certainly meet with the approval of draftsmen. Regarding price, they would be within the reach of all without depriving them of a lunch through the week.

T. SUMNER PATTERSON.

New York City.

Knurling Tools.

Editor American Machinist:

Conversing with the "tool maker" on Mr. C. H. Wilcox's article in your February 16 issue, in which a balanced knurling tool is shown, led us to compare it with some that have been in use here for several years past, and made by the above tool maker. The only advantage our Fig. 1, annexed sketch, has over the one shown in the above issue is that it can be worked and the single roll set up at the same time, by turning the handle which does the work with one screw instead of two.

Fig. 2 shows a set made to be used in a common die stock.

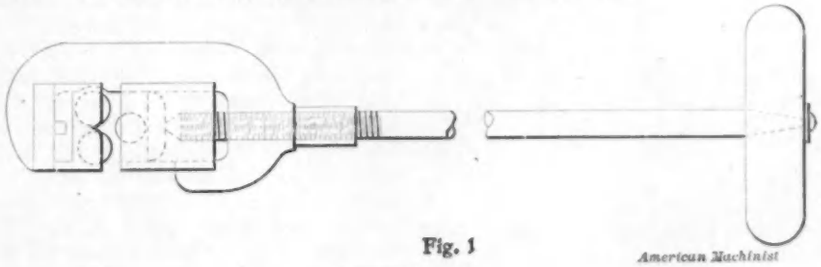


Fig. 1

KNURLING TOOL.

Either kind can be used with the work in the vise or in the lathe, and if in the latter, can be fed by the lathe feed. I scarcely see the utility of the rule joint shown in Mr. Wilcox's tool.

WM. NEWTON.

[The joint referred to is an important feature of a knurling tool that is to be held in the tool-post of a lathe instead of in the hand as the tool described by Mr. Newton

is evidently intended to be. This joint, however, is a patented feature of knurling tools.—Ed.]

Some Experience in Shrinking.

Editor American Machinist:

I should like to ask some of the readers of the "American Machinist" if they can throw any light on a little experience I have just had in shrinking.

The piece to be shrunk was a steel casting 6 inches in diameter and 6 inches long, outside of which was corrugated. The shaft was turned about 1 15-16 inches in diameter, allowing about 1-32 inch for shrink. The casting was heated to a good cherry red all over. The shaft was then slipped in and was tight just at the time that the casting commenced to show a tinge of black around the arbor.

About one hour afterwards it was discovered that this roller was loose. No signs of a crack could be discovered, and as the "fellow" said, "I was completely nonplused." In the particular line in which I am working it happens that shrinks are made daily, and in an experience extending over many years, both for myself and associates, we have never seen anything like this before.

This same casting had been shrunk on once before and after being used a year became loose. It is a roller on a machine for bending tires.

If anyone can explain this I shall be very much obliged to them.

"GLASSES."

[While we do not feel certain that we can explain the cause of this difficulty, we do feel quite certain that very much excess allowance was made for shrinking, and that the heat of the casting was far too high. Instead of 1-32 inch the allowance should not have been over about .003 inch, or about one-tenth the amount actually allowed, and a heat about equivalent to a straw color in tempering would be sufficient. We think that where such an excessive allowance is made and the piece made red-hot it is simply stretched or permanently enlarged during the cooling process, and that the contact never becomes firmer than that due to the resistance of the red-hot metal; for, later, the excessive heat is transferred to the shaft, causing it to expand, after which shaft and roll contract together by the further cooling.—Ed.]

A Foundry Kink.

Editor American Machinist:

I note what you say about correspondents trying to write in a style they would not use when talking, and am thereby encouraged.

Now, here is a shop kink for the foundry that may be useful to some. (I am not a molder, but a machinist.) I noticed one day the coremaker making a difficult core—difficult chiefly on account of the venting—and I suggested getting some wax or paraffine tapers, such as are used for gas lighters. He did so, and after that there was no trouble, and they now use them on everything that a straight wire won't vent. The wax melts into the sand and when the cores are baked the wick can be easily drawn out or left in if preferred.

. . . . . .

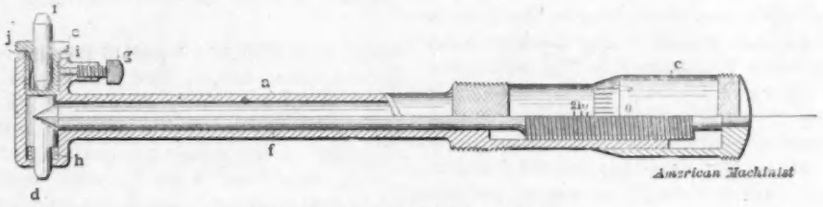
I like the suggestion of your correspondent who wonders why lathe makers give only swing and length of bed, and not the dimension the customer wants most, namely, the distance between centers. Apropos of this, in the same issue Sellers advertises a lathe with bed a certain length and so far between centers. There must have been "transference of thought" in this case. E. S. NEWTON.

[Nearly all catalogs of lathe builders, while they give the length of the bed, also state what the lathe will take in between centers.—Ed.]

An Inside Micrometer Caliper.

Editor American Machinist:

In response to your standing invitation to machinists, I send you a sketch and description of a caliper which I made and have taken much comfort in using. As I have not seen or heard of one like it, I give it to the craft," hoping that whoever has the patience to make one will find it as great a source of satisfaction as it has been to me. During the days of my apprenticeship (and I do not consider them over by any means, although it is some eighteen years since my first attempts in mechanics) I have had occasion to bore holes, in the lathe, which it was necessary to make as straight and as near a certain size as possible, and, as is often the case, in some of the shops, the supply of reamers was limited, and it required some pretty careful feeling with ordinary spring calipers to reach the desired result. Now, there is not, to my knowledge, on the market, an inside-micrometer caliper which will caliper less than 2 inches, and at the time I made the one which I am about to describe the one which "yours truly" could get his hands on would not caliper less than 2½ inches. Someone probably suggests, "Why not use solid gages?" Well, solid gages are all right for some work, but the supply of them was, like that of the reamers, limited, and they were not limit-gages either.



AN INSIDE MICROMETER CALIPER.

This caliper is not intended as a measuring instrument, but is to be used in connection with outside micrometer calipers for setting to the required size and variations from that size, either above or below, may be readily adjusted or detected in thousandths of an inch. It consists of the frame *a*, the spindle *b*, micrometer-sleeve c, movable contact-piece *d*, spring *h*, adjusting-nut *e*, removable contact-piece *f*, set-screw *g*, friction piece *i*, and friction-spring *j*. All parts are steel except friction-piece *i*, which is brass, and all wearing surfaces are hardened. The frame *a* is in one piece, drilled, reamed and tapped to receive the spindle *b*. The straight portion of the spindle is made a nice working fit in the frame by grinding (after it is hardened) for about 1½ inches from the point. In fact, it is necessary to the proper working of the caliper that the fits for all the moving parts be made in this manner.

The sleeve *c* is made a tight fit on the end of *b*, and has twenty-five divisions. The spindle is threaded twenty-four to the inch, and the angle of its point is such that one revolution causes the contact-piece *d* to move twenty-five thousandths of an inch, and it has a range of one-tenth inch.

The contact-piece *d* is first turned to fit in its proper place, but the body of it is made considerably longer than necessary. A pointed reamer, the same shape and size as the point and unthreaded portion of the spindle, is then inserted, and a conical hole made in the piece of such a depth that the point of the reamer just comes through. It is then cut in two, leaving a half-conical face on *d* to form a seat for the point of the spindle *b*. This method avoids the necessity of making a perpendicular key-seat in *d*, and a pin or key in the frame to keep the piece from turning, which would be required if the angular face of *d* were made flat. The movement of *d* will be uniform if the point of the spindle is not forced upon it to a greater depth than that to which the conical hole was reamed.

The adjusting nut *e* is threaded forty to the inch and reamed to receive ⅛-inch Stubs steel for contact pieces *f*, which may be of lengths to suit the requirements of the user. There is a small perpendicular groove cut in *e* to receive a small bent spring *j*, which forms a friction on *f*, to prevent it falling out. The ⅛-inch hole in *e* is drilled clear through, and a little bar 1-16 inch wide dovetailed crosswise

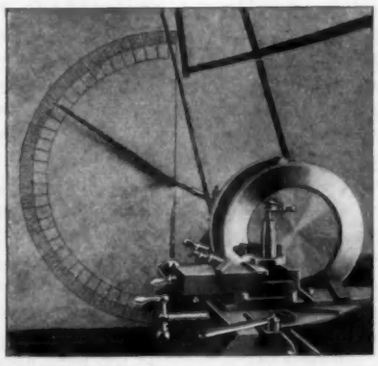
at the bottom for the ends of contact-pieces to butt against. The office of set-screw *g* and friction-piece *i* is obvious, also that of spring *h*.

In setting the caliper, an outside micrometer is first set to the required size, the zero line of *c* is made to agree with the zero line on barrel of *a*, the proper contact-piece *f* is inserted in *e*, which is turned until the caliper is adjusted to outside micrometer; then *c* is clamped in position by *g*. As a hole is being bored, the spindle may be slacked up several thousandths to allow the caliper being inserted in the hole when it is near the finished size. The depth of a finishing cut may be determined also if the hole is tapering, and how much. When the zero lines agree the hole is the required size, and the amount of guessing one has to do is reduced to the minimum. It will caliper holes or slots from 1 inch up, and may be inserted to a greater depth than a caliper square or vernier. The fact that readings of variations may be taken while the caliper is in a hole is a great advantage. S. T. FONDA.

An Indexing Idea.

Editor American Machinist:

I send you a photograph, thinking it might interest someone to know how a job of indexing is sometimes done in a country shop. I carefully lined up a rod through the hollow spindle of a lathe and pivoted it on a convenient wall. From this center I scribed a circle and graduated



A SCHEME FOR GRADUATING IN THE LATHE.

it into degrees. As this circle was 6 feet in diameter and the work in the lathe only 18 inches, it is obvious that the reduction was sufficient to insure a fair degree of accuracy. With a sharp pointed tool in the tool post, and a stop bolted to the ways of the lathe for the carriage to abut against, so as to regulate the depth of the graduations, I had a comparatively easy job. After marking, I numbered the degrees with the ordinary steel dies. The work indexed was the base of a swivel chuck. JOHN W. MILLER.

For Improving the Lathe.

Editor American Machinist:

As the faults of the engine lathe have been so well ventilated perhaps it would be well for someone to attempt to suggest a remedy.

The only and obvious way to eliminate the upward pull of the belt is the use of a motor in the head-stock, as has been done with entire success. This would permit the placing of the back gears under the live spindle entirely out of the way and protected from dirt or injury. A friction clutch for connecting and disconnecting the back gears while running, similar to those used on turret lathes, would also be a great improvement.

B. J. WILLEY.

The Better Shape for the Cutting-off Tool.

Editor American Machinist:

I wish to call the attention of readers of the "American Machinist" to what seems to me to be the best way of forging offset cutting-off or parting tools for the lathe. I do not think it new to all, but those who have used only the usual style of Figs. 1 and 2 do not know the advantage of the other kind as shown in Figs. 3 and 4. Figs. 1 and 3 show the preliminary shapes in forging, and Figs. 2 and 4 show the finished tools. The first step in the forging is practically the same in either case, except that the offset is made at the opposite side of the steel, or the tool, after it is worked down thin is bent the reverse way. As thus made, the tool seems to spring less and not to heat up so fast. C. N. FRISK.

Brooklyn, N. Y.

A Laying-out Table and Its Uses.

Editor American Machinist:

I wish to show some of the advantages of having a "laying-out" plate of proper proportions, and a system in connection therewith for checking forged and all manner of miscellaneous pieces, preparatory to doing work in the various stages, as well as for laying out work generally. I will describe such plate and its uses as observed in a leading machine works. The plate is of cast iron, 6 feet wide by 12 feet long, being planed to exact diameter both as to length and width. It is 8 inches deep, being of the hollow or box shape, strongly reinforced by ribs running lengthwise 14 inches apart, and crosswise 18 inches apart. The ribs are ⅞ inch in thickness, and are allowed to go the full depth; the main face of ribs, ends and sides being rough planed to form a level face for bearing upon a wooden framework, which it rests upon. There is a projection of ⅜ inch of the top face of the plate all around, 1½ inches in depth from the top of the plate. Care is taken to plane this plate perfectly true in every way, so as to be free from "wind," and the ends square with the sides, likewise to have the 1½ inches of width around the upper edge square with the finished top face. The top face has lines cut in its face by a tool which makes a very narrow, yet very distinct mark. These lines run lengthwise at a space of 3 inches apart, beginning 3 inches from each side; likewise, for the long way of the plate, the lines are 6 inches apart, beginning 6 inches from each end. These lines are numbered on each end and each side. The numbers on the ends are 3 inches, 6 inches, 9 inches, etc., while on the sides they are for every foot.

The system in vogue in connection with the laying-out plate at the place before referred to is as follows: All forged work to be taken to the machine shop, to have machine work of any description done upon it, is "checked" at this plate to see that the terms of the drawings have been complied with—the object being to discover any error that may exist at the earliest possible time. The inspection on

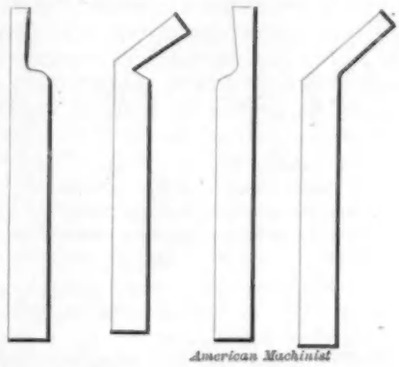


Fig. 1 Fig. 2 Fig. 3 Fig. 4

THE BETTER WAY TO MAKE A CUTTING-OFF TOOL.

the part of the blacksmith is not sufficient, for the obvious reason that his work is rarely ever cold and not in its normal condition at the time when he must do his "checking."

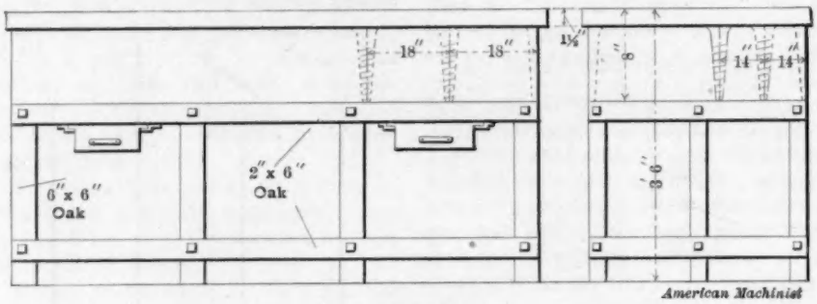
The laying-out plate was so situated as to be convenient of access from the smith shop, or so that forged work being brought in would simply stop there long enough to be inspected, tested or "layed out," as the case might be; or perhaps "go back" to be made as per drawing requirements. Malleable castings and steel castings were taken there for examination and testing, to see that they were straightened, or otherwise corrected to meet requirements. In no case did they allow this preliminary examination to be made on the machine that was to do the work.

The man in charge, and who does this work, has a very full complement of tools and appurtenances, such as blocks of iron of various sizes, suitable to the range of work; small screw jacks and blocks arranged with screws in them, for rapidly setting in position for testing any piece of any shape, and from the smallest piece

up to several tons in weight. One piece I have in mind was a huge mass weighing 4 tons, in part of structural material, the requirements being that holes be laid out for boring in a horizontal boring mill, so that they would align perfectly with other parts of the structure that would have to be removed preparatory to its going into the machine. It was handled on and off the plate by an electric crane.

This laying-out plate rests on a wooden frame of oak having ten legs, with strips running top and bottom, set in firmly, and fastened with bolts, making a very strong and durable support. The plate when set up was leveled with a surveyor's leveling instrument; care being taken to have a good bearing for each leg.

In connection with the "laying-out" plate are two shelved bins, each 16 feet long by 4 feet in width, each having five shelves 12 inches apart vertically, in which are kept all the drilling jigs used in the shop, all of which are in the custody of the layer-out. All work to be drilled, whether by jig or from laying out, has to be done by his check, as in many cases jigs are made susceptible of adjustment, and this is done by the layer-out. When the jigs are out of service they are returned to the layer-out, and by him inspected and placed where they belong.



A LAYING-OUT TABLE.

A system of scheduling all jigs is kept; this serves all purposes for knowing what jigs are in hand, what they are for, and also for inventory purposes.

There is also a class of work that is laid out so that it can be centered in advance of being put in the lathe, the double object being to insure that it will turn up to drawing, and to save time at the lathe. The same is true of a large class of work that has to go on planers, and where planer and lathe capacity is limited it is most important.

In connection with this work on laying-out plate, it can be said that one man does all the laying-out work done in the shop in question, where eight improved modern drilling tools of large type are employed. Also two or three small drills are in continuous use, and the general work done in the order here described. A post crane is in position to cover the entire plate, equipped with an improved trolley with despatch hoisting mechanism for the rapid handling of pieces too heavy to be placed by the workman by a direct lift.

In order to have this plate and the attending system fully understood and appreciated, a full description of many of the appliances used when it should be given. This, however, has not been done, and will not at this time be attempted, beyond saying that the blocks and parallel pieces already mentioned have special features in the way of V's planed crosswise and in the ends, for the purpose of holding shafting, pins and other round shapes, so as to bring them to a perfect parallel with the plane of the plate.

Others have distinctive features, such as lines on the blocks, which, when placed over the lines on table, bring the shaft in line with it, etc. Machinists, however, are all familiar with the present good supply of surface gages, squares of various types and designs, and similar things which, when taken in connection with a table such as I have shown, afford great possibilities for the execution of work, and for securing that accuracy which, once established, keeps things going right, but which if laid out wrong can only end wrong.

OBSERVER.

Some Questions Regarding the Premium Plan With Answers to Them.

We have received a letter from a Canadian shop manager who, after expressing approval of the principle involved in the premium plan, proceeds to ask some very pertinent questions regarding its applicability to the conditions which he has to meet, and as such questions are apt to present themselves to others, it seems worth while to discuss them here.

Our correspondent's first query is: "In our shops we have a great variety of work, and it is difficult to keep the men working steadily on any one piece of work; but we have to take them off the regular standard work to do repairing and small jobs. Now, can the plan be worked where these conditions prevail?"

There is, so far as known, no shop where the plan is in use in which it is applied to all the work done, or in which the workmen do not repeatedly pass back and forth from premium work to work not on premiums, and the facility for doing this forms one of the minor advantages of the plan which was not touched upon in the article published in our issue of March 9. Piece work and day work involve two distinct systems of cost-keeping, and the transfer of a workman from a piece-work to a day-work job involves the transfer of his time record from one class to the other. This is, of course, not an insuperable difficulty with piece work, and in fact day work and piece work are very often done in the same shop and under conditions like those given by our correspondent, but the premium plan involves no such double system of time-accounting as does piece work. All workmen are on the regular pay-roll and are paid for their time in the shop precisely as though the premium plan did not exist. Whenever a job on which a premium has been set is given to a workman, a premium ticket is issued to him which carries the name of the job, a statement of the time limit, and another of the premium rate for each hour saved over the time limit, together with blanks for entering the hours at which the job was begun and finished—the entries for the time being made by the foreman. When the job is finished, this ticket gives all the data for calculating the amount of the premium which is charged to the cost of the job and credited to the workman—the credit being entered in a premium record book. This book is ruled in parallel columns for the successive premiums, and the names of the workmen are entered line by line at the left. As the premiums are earned they are entered opposite the workmen's names, and when pay day comes they are totaled and paid out as an addition to the regular daily wages. When not engaged on premium work no tickets are issued and no entries in the premium book are made. The two classes of work run side by side; premium work is taken up and finished and transition from premium to day work takes place at any hour of the day without friction or difficulty. To provide for the interruption of a piece of premium work by some rush job, it is only necessary to arrange the ticket so as to allow several entries to be made for starting and stopping work—the sum of all the time worked giving the total hours on the job. This took place repeatedly at the Canadian Rand Drill Company's works, and caused no difficulty.

(2) "How is a large contract run, such as building a number of machines complete—is it subdivided so that each piece stands by itself, or is the whole contract taken as a unit and the premium earned divided among the men working on the contract in proportion to their wages?"

In the original paper before the American Society of Mechanical Engineers the application of the plan to machines as a whole, and as described by our correspondent, was distinctly proposed, but, so far as the practice of the shops using the

plan is known, this application has not yet been made—the premiums being based on the individual pieces or individual operations. The writer believes the applicability of the plan to this class of work to be another commanding advantage, as it enables it to be applied to a very large class of work to which piece work is not applicable at all. There is an immense amount of machine building done, consisting of machines which are repeated over and over again, but not in sufficient numbers at any one time to justify their reduction to a manufacturing basis, the keeping of detailed costs, or the giving out of the work by the piece—either by piece work or on premiums. The time consumed on the machine as a whole is, however, accurately kept, and there is no reason in the world why a premium should not be offered, based on the entire time consumed in making the machine and divided among the men when the job is completed. Our correspondent's shop is apparently excellently adapted to this application of the system, and we should be glad to have him pioneer it in this field and report results.

(3) "Is there any trouble in working it along with day work, owing to the day workers becoming dissatisfied at the higher rates earned by the premium workers?"

The only difficulty that has been reported from this cause is a constant call from the men for more premium work. The superintendent of the works, whose experience formed the basis of the article of March 9, remarked during a recent interview that he was "working the office force day and night, overhauling old records, in order to satisfy the demand from the shop for more premiums." In point of fact, a shop force will not ordinarily be divided into day workers and premium workers, but most of the force will work at times on one plan and at other times on the other. Wherever the plan has been in operation long enough for the men to become really acquainted with it, it has become highly popular. A plan which deliberately sets out to increase wages can hardly be other than popular.

(3) "Is there any tendency to slight the work in order to earn the premiums, making it necessary to have very careful inspection?"

There is undoubtedly a tendency in this direction. The same tendency inheres to piece work, but it does not operate to prevent the use of the piece-work system. In point of fact, some of the finest machine work done in this country is done by piece work, and if this difficulty can be met under that plan, it can also be met under the premium plan. One method of meeting it is by a series of "negative premiums," or fines, the loss to the workman due to a spoiled piece being made two or three times as much as the gain had the spoiled piece been a good one—thereby making it unprofitable for him to do poor work. Another plan, which is also common in piece-work shops, is to make each man responsible for the piece as he *receives* it. The large shop referred to in the article of March 9 without the name being given, follows this plan. The result has been to make every man in the shop an inspector, and, according to the testimony of the manager, to distinctly *improve* the general quality of the work. The superintendent of the shop from whose experience the tables of March 9 were drawn, says that the work has not deteriorated, and the column of dimension limits shows it to be high-grade work. It is easy enough to get poor work by the day-work plan if no checks are provided. The bars cannot safely be left down with any system of payment.

(4) "Is it not necessary to have a very complete record of the time required to do the different pieces of work before starting the system?"

If the premiums are applied to the individual pieces, such records are advisable; but if applied to the entire machine in the manner described in the answer to the second question, the total time on the entire machine only is needed. In point of fact, in one, and probably two, of the shops referred to in the previous article, the premiums are regularly applied to new work done for the first time, the time limits being based on estimates. This of course involves a highly competent estimating department, which these shops have. It should be observed, however, that the consequences of an error are not so serious with this system as with piece work. If too high a figure be set for the time necessary to do a given job, the result with piece work is that the workman gets the full benefit of the mistake, whereas with the premium plan he gets but one-half, one-third or one-fourth of it, depending on the ratio between the premium and the wages rates. The importance of accurate records is thus materially less with the premium than with the piece-work plan. Moreover, the reduction of the actual time below the proper limit tends to neutralize the error—an action which has no parallel in the piece-work system. Thus, suppose the old time on a job to have been ten hours and the workman to receive $3 per day. Suppose also that a mistake is made, and the time limit be set at twelve hours, and suppose the workman to do the work in nine hours—that is, save three hours from the time limit and one hour from the old time. The comparison of costs is as follows—the premium rate being 10 cents:

DAY-WORK PLAN.

Ten hours at 30 cents	$3 00

PREMIUM PLAN.

Nine hours at 30 cents	$2 70
Three hours premium time at 10 cents	30
Total	$3 00

In other words the reduction of the time one hour below the proper time limit wipes out an error of two hours in the actual time limit, and this is always the case if the premium rate is one-third the wages rate. So marked is this action that it becomes a common practice to raise the time limit above the record in cases where the record has been made by an extra good man, in order to give inferior men a chance—the aim being to offer the stimulus of the premiums to all and not reserve it for a few star workmen. Most of the work in any shop is done by average men, and the time limit should be adjusted to that class rather than to the very best. F. A. H.

Technical Publications.

"Petroleum Motor-Cars." By Louis Lockert. 218 5x7¼-inch pages, with 92 illustrations. D. Van Nostrand Company.

This book comprises general descriptions of most of the petroleum horseless carriages that have been produced, and will be of interest to those at work in this field. The illustrations, while numerous, are inferior in character, and in fact, in some instances, are scarcely intelligible—serving to show the general appearance and arrangement of the various carriages rather than details of construction.

The author is under no illusions as to the limited degree of success attained by even the best auto-cars, and frankly states that much remains to be done. Thus in his opening chapter he says: "It is no exaggeration to say that of all the motors now in use for propelling horseless carriages, there is not one that gives complete satisfation or is perfectly adapted to the purpose for which it is intended," and again: "There is no doubt that in four or five years, or perhaps earlier, almost all the hydro-carburet cars now in use will have disappeared and will have been replaced by others better suited to the object in view, both as regards the motors, the motion and the general design."

As a general view of what has been accomplished to date, the book will serve a useful purpose, and its frank recognition of the defects of existing carriages should serve to temper the enthusiasm of those who consider that the horse is ready for the retired list.

"The Locomotive Up to Date." By Charles McShane. 711 5½x8½-inch pages, 380 illustrations. Published by Griffin & Winters, Chicago. $2.50.

This is an agglomeration of matter such as a man not well informed on the subject might be expected to gather up when determined to make a book. It adds nothing to the literature of the subject, so far as we can see, for practically all it contains has been previously published, and some of it ought to be forgotten by those who would be well informed about the locomotive.

AMERICAN MACHINIST

Published Thursdays by

American Machinist Press,

218 William St., New York.

JOHN A. HILL, President and Treasurer.

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Subscription Price:

$3.00 a year in advance, postage prepaid in the United States, Canada and Mexico.

$4.00 a year to other countries, postage prepaid.

Agents for Great Britain:
CHAS. CHURCHILL & CO.,
9 to 15 Leonard St., Finsbury, London.
FENWICK FRERES & CO.,
21 Rue Martel, Paris,
Representative for France, Belgium, Switzerland and Italy.

Entered at Post Office, New York, as second-class mail matter.

For Sale by Newsdealers, everywhere.

No back Numbers beyond 1898.

The Growth of Combinations—A Time for Caution.

During the past two months industrial organizations with an aggregate capitalization of over one thousand millions of dollars have been formed. Besides these that have actually formed, others have been and are talked of and proposed, which make it probable that during this month, at least, the record for January and February will be equalled.

Few, if any, of these are trusts or combinations in the original sense of that term. They are for the most part genuine consolidations. That is to say, a number of smaller establishments in a given industry are purchased outright by a company organized for that purpose, payment being made in stock of the new company, interest-bearing bonds, cash or all three combined as circumstances dictate.

This process has been referred to as "a capitalization of our industrial supremacy," which term we understand to mean that, recent events having shown that we lead the world in many lines of industry and are likely to continue to do so for some time, other nations must pay tribute to us, and the profits will pay dividends upon a capital far in excess of what would be required to duplicate the plants in which the manufacturing is to be done.

This may be so, but if one country can long be the chief source of food supplies, and at the same time the chief purveyor of manufactured articles, then all the teachings of all the recognized political economists are at fault.

It is our belief that the present situation is one full of danger for those who are not careful to keep their affairs well in hand. Feverish activity prevails in most lines, and calm consideration will convince almost anyone that the valuations being placed upon industrial establishments and the business connected with them are beyond all reasonable hope of continued dividends. A re-adjustment seems inevitable sooner or later, and it is to be remembered that when this process begins there will be, in the absence of intervening legislation, exactly the same exposure to a money panic as took place in 1893, for since that time, notwithstanding we have gone through a political campaign fought on the issue of monetary reform, a campaign in which "sound money" was supposed to have signally triumphed, no legislation has been enacted which places us in a position at all more secure than we have occupied heretofore. The Government is still mixed up with the banking business, and a diminished gold reserve still can seem to threaten the integrity of the United States treasury and thus precipitate and intensify a money panic.

It would seem to be a good time to go carefully, to keep one's business well in hand, and especially is it a good time for machinery builders to cultivate foreign trade. During the recently passed period of depression many of our machine shops were kept going almost solely by export trade. The time may come, and probably will come, when this foreign trade will again be of supreme importance, and the time to cultivate and extend it is now.

Liquid Air.

Perpetual motion is no more to be found in liquid air than in anything else. So far as perpetual motion means something for nothing, or much for little, the promise of its realization by the way of liquid air is most shadowy and unsubstantial. An article in "McClure's Magazine" for March, giving an account of Mr. Tripler's work in producing liquid air, and of his later experiments toward its practical employment, has attracted wide attention. It must be said that some of the statements contained in the article referred to are more than questionable. They are self-evidently and absurdly impossible. Although the article was evidently prepared with Mr. Tripler's knowledge and co-operation, it is, after all, most evidently the work of a professional "writer-up" of newspaper articles who piles up words with equal facility upon any subject without ever embodying accuracy of statement or reliability of information. Mr. Tripler is made to say: "I have actually made about ten gallons of liquid air in my liquifier by the use of about three gallons in my engine. There is therefore a surplusage of seven gallons that has cost me nothing, and which I can use elsewhere for power." If that is not perpetual motion, as popularly understood, then we do not know what it is. It is sufficient to say of the statement that Mr. Dickerson, Mr. Tripler's most trusted assistant, was compelled to acknowledge, at a recent meeting of the Franklin Institute, that the statement was untrue.

We are by no means disposed to belittle Mr. Tripler's wonderful work in the production of liquid air in practically unlimited quantity. He has set a new stepping stone for the advance of physical achievement. We cannot easily believe from what has been revealed that Mr. Tripler sees much more than anyone else of the path beyond. The talk of the use of liquid air for the propulsion of steamships and balloons and similar service is purely visionary and unwarranted. It is much to be regretted that Mr. Tripler has nowhere given any accurate information, such as is certainly in his possession. For instance, it is certainly easily ascertainable how much liquid air can be produced by the expenditure of a given amount of power. What objection can there be to letting the public know this simple fact? In determining the possibilities of liquid air, making all necessary allowances for the crudity of present appliances, this single fact would give us a trustworthy idea of the first cost of liquid air. Knowing as we do the cubic capacity of the air cylinder of Mr. Tripler's compressor, and accepting Mr. Tripler's own statement of the rate at which the liquid air is produced, it is easily demonstrable that of the air compressed to 2,500 pounds or so, not one-twentieth of the weight of it is realized as liquid air. That is, of 20 pounds of air compressed, 19 pounds of the air are thrown away to satisfy the cooling conditions, and 1 pound of liquid air, or less, remains. This gives an idea of the power economy of liquid air so far as the production of the liquid is concerned.

As to the development of power from liquid air, we only know that Mr. Tripler has used an unmeasured quantity of liquid air to cause a steam engine to run without doing any appreciable or measured work. This simple experience and a restive imagination seem to be all the basis for the promises of the future wide use of liquid air for power development. If Mr. Tripler can give us any precise information at variance with the above, we will gladly welcome it and aid in its dissemination.

Questions and Answers.

Name and address of writer must accompany every question. Questions must pertain to our specialties and be of general interest. We cannot undertake to answer by mail.

(29) A. S. G., Millville, N. J., asks: How many volumes of free air must be compressed to obtain any given pressure? *A.*—Divide the absolute pressure of the compressed air (or the gage pressure plus the pressure of the atmosphere, usually at sea level called 14.7 pounds) by the pressure of the atmosphere, and the result will be the number of volumes of free air required. Thus to compress air to 75 pounds gage the number of volumes of free air required will be $(75 + 14.7) \div 14.7 = 6.1$ atmospheres. This assumes that the compressed air is at the same temperature as the free air. As to the effect of different barometric pressures and temperatures see Richards' "Compressed Air."

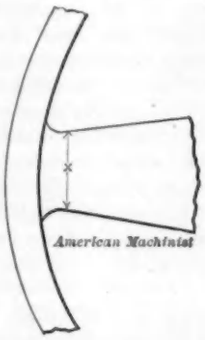
(30) E. S. N., Fond du Lac, Wis., refers to the formula for arms of whole flywheels published in our issue of April 23, 1896, namely:

$$x = \tfrac{7}{8}'' + .04d + .153c,$$

in which

x = dimension shown in sketch,
d = diameter of wheel in inches,
c = area of cross-section of rim in square inches.

He has applied this formula to a wheel



120 inches diameter with a rim 25 inches wide by 2 inches thick, and gets

$$x = \tfrac{7}{8}'' + 4.8 + 7.65,$$
$$= 13.325'',$$

which is absurdly heavy. A.—You have made a mistake in reading the notation for c. This letter represents the side of a square of equal area with the cross-section of the rim. That is, if a = the width and b the thickness of the rim,

$$c = \sqrt{a \times b},$$
$$= \sqrt{25 \times 2},$$
$$= 7.07.$$

Substituting this value gives:

$$x = \tfrac{7}{8}'' + 4.80 + 1.18,$$
$$= 6.85''.$$

If you lay this wheel out as a scale drawing, the arms will look heavy, but considerable experience with the formula leads us to believe that the wheel in iron will be satisfactory, although the rim is pretty wide for a pulley with one set of arms. Should you make it, we should be glad to know the result.

(31) B. M. W., Aberdeen, Wash., asks how to proceed in calculating the pressure in the receiver of a compound engine. A.—This pressure depends upon the ratio between the volumes of high and low-pressure cylinders measured at point of cut-off. The former measures the volume of steam taken from the boiler, and the latter the volume taken from the receiver, and, the weight of steam being the same in both cases, the pressures will be inversely proportioned to these volumes—expansion of the steam being supposed to be in accordance with Mariott's law, as it actually is nearly enough for such calculations. That is

$$\left.\begin{matrix}\text{Pressure}\\ \text{in}\\ \text{receiver}\end{matrix}\right\} = \left\{\begin{matrix}\text{Pressure at}\\ \text{cut-off in}\\ \text{H. P. cyl.}\end{matrix}\right\} \times \frac{\text{Vol. of H. P. cyl. at cut-off}}{\text{Vol. of L. P. cyl. at cut-off}}$$

The presence or absence of "drop" in the receiver pressure is determined by the point of cut-off in the low-pressure cylinder. If the volume of the low-pressure cylinder at cut-off exceeds that of the high-pressure cylinder at release, this drop will be present, because a greater volume of steam is taken out of the cylinder by the low-pressure cylinder than is put into it by the high. If, however, the low pressure cut-off be shortened the receiver pressure will rise until, when the volume of the low pressure cylinder at cut-off equals that of the high-pressure cylinder at release, the volume taken out will obviously equal that put in and there will be no drop. The above ignores the question of condensation, which will modify the result somewhat, but the results obtained as above will be substantially correct.

(32) H. J. W., Toledo, Ohio, has a small dynamo for incandescent lighting. The armature is wound with wire of 24 gage and the field coils with 27 gage. At 4,200 revolutions per minute the machine gives 52 volts pressure. He desires to reduce the speed to 3,200 and raise the voltage, and asks what changes in the wiring are necessary. A.—Since the field wire is smaller than that on the armature, it is evident that the machine is shunt wound, and this being the case, the voltage can be increased to some extent by enlarging the field wire, as thereby the current through the field coils will be increased. The gain that can be effected in this way will depend upon the density to which the field is magnetized. Generally the fields of small machines are magnetized about as high as it is advisable to go, and in that case very little can be gained by enlarging the wire. Under the most favorable circumstances, the voltage cannot be increased by this expedient more than 10 or 15 per cent., and to accomplish even this much it is necessary to make a considerable increase in the size of wire, owing to the fact that if the current passing around the field coils is doubled the strength of the field is not increased more than 15 or 20 per cent., and in many cases even less than this. The best way to obtain the increased voltage is by rewinding the armature with a smaller wire and greater number of turns. As you desire to run the machine at 3,200 instead of 4,200 the armature turns should be increased in the proportion of about 46 to 32, the increase in turns being greater than the difference in speed so as to allow for the greater resistance of the armature. This change would increase the voltage, but at the same time it would reduce the capacity of the machine, as the armature wound with small wire could not carry as much current.

Brazil is becoming an important market for the sale of American machinery and machine tools and electrical apparatus, and it would seem that the manufacturers of the United States are alive to the great possibilities that lie in the direction of efforts for the better understanding of the conditions which exist between this country and Brazil. Every opportunity afforded for the interchange of views as to obstacles to trade and commerce between ourselves and the Brazilians will redound to our mutual benefit. In this connection it may not be amiss to state that in shipping invoices to Brazil, the weight of the component parts of articles, of what class, material, etc., are not specified by many exporters, thus causing trouble and extra expense to the importers, because under the Brazilian customs law each part pays a different duty. The Germans are generally very particular in this regard, and this acts as an inducement to importers to purchase through German houses. This hint should not go unnoticed by our manufacturers who desire to participate in the trade of Brazil.

Personal.

George K. Garvin, president of the Garvin Machine Company, sailed, March 14, on the "Kaiser Wilhelm der Grosse," for a short business trip in Europe.

Messrs. Bryan and Humphrey, consulting mechanical engineers, Turner Building, St. Louis, Mo., have removed to Rooms 706-708, Lincoln Trust Building, in the same city.

Frank C. Pratt, of the Pratt & Whitney Company, left for Europe, Saturday, March 11, to assume charge of the foreign sales department of the Pratt & Whitney Company. His headquarters and present address is 22 Old Broad street, London, England, care J. S. Morgan & Co.

Mr. W. M. O. Webber, of Boston, has recently associated with him Mr. C. M. W. Smith, formerly with E. D. Leavitt, of Cambridgeport, Mass. These two gentle-

men will carry on a consulting engineering business under the name of Webber & Smith, with offices at 53 State street, Boston, Mass.

Mr. Frank Cary, whom our readers will remember as the ingenious inventor of the curious "condensed engine" illustrated in our columns a couple of years ago, and who has been too long buried in a country photographer's den, has now become a designer and mechanical expert for the Stearns Company, Syracuse, N. Y., the well-known bicycle firm.

Mr. Cathcart, late of the United States Navy, has been appointed adjunct professor of mechanical engineering at Columbia University. Mr. Cathcart's connection with the navy began with an appointment as cadet engineer in October, 1873. From 1875 until 1891 he saw continuous service in the navy, partly at sea and partly on inspection duty, and resigned in the latter year to engage in a line of manufacture in which he had become interested. He received an appointment from Mr. Wm. H. Webb, founder of Webb's Academy, as instructor in marine engineering, in the spring of 1897, but on the breaking out of the war he volunteered and was appointed chief engineer June 10, 1898, with appointment to the Bureau of Steam Engineering at Washington. He was honorably discharged in October, 1898, and received his present appointment at Columbia in February last. He comes to his new position with warm endorsements by Chief Engineer Melville, Walter Macfarland and other men of standing in the navy. He will begin duty at Columbia in October next.

Obituary.

Henry C. Eyre, the founder of the H. C. Eyre & Co.'s foundry and machine works of Chester, Pa., but better known as a contractor and builder, died at Chester, March 13, sixty-three years old.

Robert R. Leitch, a retired chief engineer of the United States Navy, died in Brooklyn, March 14, forty-nine years old. Mr. Leitch was graduated from Annapolis in 1871 at the head of his class, and entered the navy the same year. He became a chief engineer in 1894, and retired on account of ill health in 1896.

Philo Thurston, a mechanic of the old school, died at Rockland, Me., March 5; about eighty years old. Mr. Thurston was a native of the State, and was by trade a millwright. He established and operated for many years an iron foundry in Rockland and did a thriving business, selling out to a syndicate which absorbed various other local concerns nearly a score of years ago.

William B. Middleton, general manager of the Taylor Iron & Steel Company, High Bridge, N. J., died March 8; fifty years old. His business career began with the Phoenixville Iron Company, Phoenixville, Pa., and later he was connected with various prominent manufacturing concerns. He had been superintendent of the Pennsylvania Bolt & Nut Company, Lebanon, Pa., and of the Allison Manufacturing Company, of Philadelphia.

Isaac Newton Jones, for many years the head of the puddling department of the Cambria Iron Works at Johnstown, Pa., died in Pittsburgh, March 10, eighty-three years old. Mr. Jones was a native of Wales, and was employed as a puddler there for many years before coming to Johnstown. He went to Pittsburg in 1855 and took an active interest in the organizing of labor. He was employed for years by Jones & Loughlin and by the Oliver Iron & Steel Company.

Osceola Cook, inventor of some features of the hair-clipper manufactured by Brown & Sharpe, died at Providence, R. I., on March 14, forty-five years old. Mr. Cook was a colored man and kept a barber and boot-blacking establishment, and was a prominent local character. He was a man of considerable mechanical ingenuity, having invented, besides the hair-clipper, a shampooing machine, which worked well. He weighed 449 pounds, and possessed enormous strength.

Hiram Kimball, manager of the turnbuckle department of the Cleveland City Forge & Iron Company, Cleveland, Ohio, died in that city March 9, fifty-four years old. Mr. Kimball was born in Vermont, first studied law, and then engaged in mechanical pursuits. He was employed as an engineer by A. L. Holley in the development of the Bessemer process; was later with the Edgar Thomson Steel Works, and was the inventor of many important devices, among others being those for turnbuckle manufacture, to which his later attention was given. Mr. Kimball was a member of the American Society of Mechanical Engineers.

Schuchardt & Schutte in New York.

A move of considerable significance has been made by Schuchardt & Schütte, of Berlin, in opening an office at 122 Liberty street, New York.

The new office is in charge of Mr. Max Daunert, who for some time past has been in the Berlin house, and previously was for some years engaged in business in Scotland. His duties here will be to keep informed on new developments in the machine-tool line, to purchase and ship to Berlin or other European ports, and generally to look after the interests of his principals. The new development not only indicates the proportions to which the business has grown, but also the belief of Messrs Schuchardt & Schütte that it will continue to expand. The firm, besides having largely increased the capacity of its Berlin house, now has branch houses in Cologne, Vienna, Brussels and Stockholm, and on a single steamer sailing from New York a short time ago had machine tools to the amount of 500,000 pounds aboard.

We have before us a schedule of the proposed new arrangement of studies in the course in mechanical engineering in the University of Minnesota. All the changes made are in the direction of giving the students more of what may be classed as practical school work—i. e., work which requires the exercise of faculties and the accumulation of knowledge sure to be useful in almost any work taken up after graduation. A novel feature is an elective of eight hours per week during one term of the senior year, devoted to design of special tools and fixtures for manufacturing by the system of interchangeable parts. This is likely to be of value to students, especially as it is in charge of a man who has had practical experience in that line of work.

It appears that the British navy has had unusual trouble with the cruiser "Terrible." It will be remembered that on her trial run she achieved anything but a satisfactory performance, and in her recent run from Malta to Devonport an explosion took place, resulting in the death of one man and the scalding of several others. According to report, no less than five steam pipes burst, and at various times the fires had to be drawn from under several of the boilers in order to prevent disaster, and the engineers were almost afraid to take their watches, not knowing what moment an explosion might occur. The "Terrible" is fitted with water-tube boilers, and at the time of their installation considerable discussion prevailed among naval engineers as to the practicability of using boilers of that type on so large a vessel; although the French navy had used similar boilers on smaller vessels with success.

An evidence of the extent to which American steel is finding a market in Great Britain is shown by the fact that Chas. Churchill & Co., Limited, of London, have recently been appointed agents of Park Bros., of Pittsburgh, makers of the Black Diamond steel. They will carry at their various warehouses about 200 tons of this steel ready for immediate delivery anywhere in Great Britain.

Commercial Review.

NEW YORK, SATURDAY EVENING,
March 18, 1899.

MACHINE TOOLS.

Great activity dominates shops and selling markets. The appearances of a boom are plainer than ever. Features of trade are long deliveries and strong prices.

Buyers come of their own accord in these days. He who has the tools to sell gets the order. Deliveries average two or three months in many lines. In some

cases they are much longer. The only important type of tool easy to obtain is the screw machine. These are relatively a drug upon the market because of the dullness of the bicycle industry, whereby not only is the call for screw machines retarded, but many second-hand ones are let loose to compete with the new. Besides, there is said to be less requirement for these machines in this territory than in the Central States. No tool is in more uncompromising demand than the milling machine. Planers also are urgently sought for. Companies in this city which carry many tools in stock report that the exhibits in their show rooms are being depleted and that the vacancies cannot be filled as fast as they occur.

Advances in price continue. We learn of several cases in which tool manufacturers have announced higher prices or have withdrawn old quotations during the present month. Some companies have marked up figures more than once since the inception of the strengthening movement last year. A certain Western concern has made three increases, aggregating 15 per cent. The following is given us by one party as an estimate of the average advance throughout the market of various classes of machines: On heavy tools for immediate delivery, 15 to 20 per cent.; on heavy tools for future delivery, 10 to 15 per cent.; on light tools, 10 per cent. In certain cases, however, increases have been made in machine tool prices, amounting to 25 per cent.

It is a serious question whether the price advances that have taken place thus far and that will be made in the future if the present boom continues will not injure foreign sales. Machine tool export trade is better fitted to withstand the shock of increased prices than many branches of the iron and machinery market, because of the great superiority of the American to the foreign tools. But there is a limit to the toleration by foreign buyers of exorbitant charges even for American metal-working machinery. Within a fortnight past a large order for small lathes for shipment to France was lost by an American company because of its increased prices. No doubt the advances already made on machine tools have been expedient and reasonable, and still further ones may be justified, but it is a matter worthy the careful consideration of manufacturers just to what extent it is possible to profit by the present home demand without endangering the export market. To hold the foreign field is worth no little self-sacrifice.

Less American tool sellers are said to be starting abroad this season than in former years. This is attributable in part to the fact that foreign connections have already been established. But it indicates also an absorption in domestic trade.

Sewing machine manufacturers are reported to be buying tools actively.

One of the principal local companies selling light tools regards the New England buying market as excellent. The company is wont to concentrate much effort upon that field.

The Hyatt Roller Bearing Company has received a contract to equip the big new machine shop of the General Electric Company at Schenectady with a complete outfit of hangers and boxes. The order was placed as the result of a thorough trial of Hyatt bearings in another of the General Electric's shops. In the new shop line shafting is used upon one side, while on the other the tools are to be directly driven by motors.

We call attention to the statement appearing in another column that Schuchardt & Schütte, of Berlin, are opening an office in New York.

MISCELLANEOUS.

The Snow Steam Pump Works have been awarded by the Water Commissioners of Dunkirk, N. Y., a contract for a 4,000,000-gallon pumping engine of the crank and fly-wheel type. It will have a Corliss valve gear to work under the control of a governor of 1899 design.

"When I sell goods to a consumer," remarks a manufacturer of such machine tool specialties as drill chucks, "I can expect to receive my payment at a definite time. But when I sell to a dealer I can expect to be paid some months in the future at any old time he gets ready. The middleman expects the manufacturer virtually to furnish him with the greater part of his capital. I am assured that if I attempted to sell entirely through the trade I would have to carry double the capital that I do. The dealer will accept your goods ostensibly to pay for them at a fixed early date, and then let his customer take them on trial while you wait for your money. Dealers show an extraordinary aversion for carrying a stock of a line of goods, the demand for which is not already assured. When I first put my specialties on the market I met with such cold treatment on the part of the dealers that I was forced to ignore them and build up a demand by selling directly to the consumer. Now that I have created a market for myself the dealers are ready and willing to handle my goods.

"Middlemen are ruthless price cutters in these days," he continued. "In the eighties they expected a 20 per cent. margin, now they are content with ten."

MACHINERY EXPORTS FOR JANUARY.

The "Monthly Summary of Commerce and Finance," published by the Bureau of Statistics, Treasury Department, shows for January, 1899, exports of metal-working machinery to the amount of $598,946; for January, 1898, $394,979. The figures for December, 1898, have previously been reported, $419,884. For the seven months ending January, 1899, the amount is $3,762,901, and for the seven months ending January, 1898, $2,435,867.

Electrical machinery exports were: For January, 1899, $304,515; January, 1898, $172,791; December, 1898, $247,447; seven months ending January, 1899, $1,693,048; seven months ending January, 1898, $1,090,244.

Printing presses and parts thereof: January, 1899, $40,534; January, 1898, $79,635; December, 1898, $105,304; seven months ending January, 1899, $428,728; seven months ending January, 1898, $498,656.

Pumps and pumping machinery: January, 1899, $207,600; January, 1898, $162,628; December, 1898, $286,340; seven months ending January, 1899, $1,440,711; seven months ending January, 1898, $1,117,962.

Locomotive engines: January, 1899, 38 in number, aggregating in value $322,683; January, 1898, 52, at $562,805; December, 1898, 27, at $268,593; seven months ending January, 1899, 319, at $2,949,139; seven months ending January, 1898, 221, at $1,882,198.

Stationary engines: January, 1899, 40 in number, aggregating $31,122; January, 1898, 30, at $22,512; December, 1898, 50, at $27,957; seven months ending January, 1899, 286, at $171,525; seven months ending January, 1898, 319, at $208,817.

Boilers and parts of engines: January, 1899, $80,659; January, 1898, $93,093; December, 1898, $58,192; seven months ending January, 1899, $706,885; seven months ending January, 1898, $501,363.

Sewing machines and parts thereof: January, 1899, $227,150; January, 1898, $204,313; December, 1898, $237,836; seven months ending January, 1899, $1,614,958; seven months ending January, 1898, $1,666,014.

Typewriting machines and parts thereof: January, 1899, $198,318; January, 1898, $161,918; December, 1898, $183,917; seven months ending January, 1899, $1,173,156; seven months ending January, 1898, $961,659.

Shoe machinery: January, 1899, $53,903; January, 1898, $89,311; December, 1898, $85,306; seven months ending January, 1899, $503,038; seven months ending January, 1898, $494,563.

CINCINNATI REPORT.

In all directions is manifest a continued improvement of demand for machine tools and other machinery. February brought more orders than January, with a still greater excess over the first months of 1898. Almost all manufacturers have enough to keep them busy for a considerable time to come. The taxation of facilities maintains the boom in plant enlargement. Some of the larger and older manufacturers are talking of erecting big new modern plants, though their plans are not yet developed. Certain new plants and additions which were to have been begun before this time have been delayed by the inclement weather, but with the coming of spring may be pushed forward.

The expansion of trade is chiefly do-

mestic. One manufacturer who has many orders on hand reports that every one is for the home field.

The foreign trade of the American Tool Works Company keeps on in enlarged proportions, and the domestic demand is greatly increased over that of the first two months of 1898. One feature of their business for several years has been the supply of machine tools to shops of technical schools. The Calumet & Hecla Mining Company has lately ordered fourteen machine tools for a school at Calumet, Mich. Another good order has come from Tulane Technical School, New Orleans La.

The J. A. Fay & Egan Company reports marked improvement in woodworking industries in the South, particularly in the Carolinas. Increased prosperity is manifest among furniture and chair manufacturers. Planing mills in the Northwest are becoming more active.

A good share of the present heavy trade in water-tube boilers of the Stirling Company is coming from the Cincinnati territory. For instance, one order has lately been booked for 1,000 horse-power of boilers for a local plant.

The Cincinnati Planer Company is gradually getting in its machine tools. By April 1 they expect to be in good shape. From the way orders have come in thus far they will have enough on their books when fully started up to keep them busy for a considerable time to come.

The Silk, Anderson Company has rented increased shop space, and is putting in new tools.

The trade of the Cincinnati Shaper Company is such that they are increasing their force as fast as they can get in new tools, which ere long will be accomplished up to the space limit.

CHICAGO MACHINERY MARKET.

Among the machine tools there seems to have been an unusual run upon planers in this market during the past few weeks. It is much more difficult to buy a planer on reasonable delivery than any other tool. It is said that on account of the greater expense attaching to the purchase of that tool most shop men have been doing without new machines for several years, and now that the time has come when a purchase is imperative they are all in the market at one time. Builders, acting upon the scant demand previously, have practically no planers in stock with which to meet this emergency. But it is thought that the famine is only temporary, as several new works for the construction of planers are under construction.

The scarcity referred to above is relative. The supply of all kinds of tools is unequal to the orders that have lately been placed, and builders, instead of gaining upon their trade, are steadily falling behind. It is considered good delivery now with some of the larger makers if they promise shipment within six months. And herein prosperity and active trade are coming to those Chicago supply houses which, several months ago perceiving the large volume of business ahead, ordered very largely from the builders, for thereby they are now able to make earlier deliveries than can the shops direct. It is perhaps due partially to this circumstance that supply houses here report a trade preponderatingly superior to anything within recent experience. It is related that Chicago is selling into a wider territory than it has done for years. A sale for Chicago shipment to southeastern Ohio was made a day or two ago, and business to that degree of remoteness is said to be not uncommon. February was a very good month for machine tools, comparisons being favorable in many instances as far back as 1892, and March is making to date a showing equally good. Here and there a few small equipments are being sold for new machine shops, for repair work chiefly, practical machinists who have an ambition to operate shops of their own deeming this a suitable time to start into business. But the great bulk of trade is still with the old shops, which are adding slowly but steadily to their present machinery.

Prices of machinery are from 5 to 25 per cent. higher than when the low mark

(*Continued on page 41.*)

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting, Grant; see p. 16.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Forming lathes. Mer.Mach.T.Co.,Meriden,Ct.

Wanted—Gap lathe to take in near 30 to 60 inches. G. W. Porter, Lindsey, Pa.

Agents in every shop to sell my tools; liberal discounts. E. G. Smith, Columbia, Pa.

The Dutton Wet Twist Drill-Grinder is sold by the Garvin Machine Co., New York City.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," price $1, post paid. J.L.Lucas,Prov.,R.I. Send for index sheet.

Selden Packing for stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., New York.

Threads and gears; easy rules to cut any thread possible to be cut in the lathe, without algebra, sent to any address for 25c. by G. W. Dixon, Spring Lake, Mich.

Best workmanship; reasonable charges; watch, clock and other light machinery; send for samples of punch and die work. Waltham Machine Works, Waltham, Mass.

For Sale—A fully equipped machine shop enjoying the city trade and all work from surrounding towns. For particulars write The Heer Machine Works, Alliance, Ohio.

Expert seeks tabular work; tables carefully calculated to any formula; catalogs written up; metric calculations undertaken. Wm. Cox, 15 Jaques st., Elizabeth, N. J.

For Sale—Ingersoll-Sergeant 8x8-in. belt air compressor; good as new; capacity 69 cubic feet air per minute, 80 pounds pressure. Address Box 184, AMERICAN MACHINIST.

Having drawings of electric cars, trucks, snow-plows, sweepers, transfer-tables, want to hear from those desirous of building them; references and sample. Address Box 181, AMERICAN MACHINIST.

Institutions retiring from business having machine tools, brass or wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

For Sale or Rent—Foundry and machine shop with additional land, in good condition and well equipped for medium heavy work; capacity of foundry 7 tons per day; located on railroad within eight miles of New York; terms easy. Call or address J. F. Sweasy, 26 Nassau street, New York.

Wants.

Situations and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisement under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

Wanted—Position as foreman pattern maker, or would work at bench. Address Pattern, Lock Box 383, Holyoke, Mass.

Foundry foreman wishes position; experienced, heavy or medium castings; N. Y. or N. E. preferred. Box 168, AMER. MACHINIST.

Marine and stationary engine designer and draftsman of wide experience, now engaged, will change; Eastern States preferred. Box 189, AMERICAN MACHINIST.

An engineer desires to engage with manufacturing concern as superintendent or chief engineer; 22 years' experience in all departments, and as salesman; has college training. Box 193, AMERICAN MACHINIST.

Position wanted by a practical expert as supt. or foreman of sewing-machine, typewriter, bicycle, or such manufacturing concern; experienced in charge of men; am a practical mechanic, and capable of designing tools, jigs and labor-saving devices. Box 170, AMERICAN MACHINIST.

Wanted—An opportunity by an American man, 33 years of age, now supt. of an American manufacturing company; a chance to go abroad as representative of some company engaged in a mechanical line; advertiser is a first-class steam engineer. Address Box 179, AMERICAN MACHINIST.

Wanted—By an engineer and manufacturer in general engineering work, a position as manager of works; or would like to join a new enterprise of engineering and founding; can introduce desirable lines of specialties; has extensive experience in all departments. Address "Originator," AMERICAN MACHINIST.

Wanted—Position as foreman by first-class machinist, and also a draftsman; have had three years' instruction in mechanical engineering; can give best reference. Box 174, AMERICAN MACHINIST.

By a young man, with 10 years' experience, at present employed, who thoroughly understands buying, shipping, both foreign and domestic, and handling of men; best of reference. Address Box 187, AMER. MACH.

The advertiser is a well-known engineer who has given especial attention to shop cost, his system enabling him to show daily cost of all work; he is a thorough shop man, and able to take charge of an engineering works; can handle men; speaks French well, and German fairly; knows Europe; is well up in all kinds of machine-shop tools; has his own business now, but, differing from his partners, desires to withdraw, and seeks a position of responsibility. Address Box 182, AMERICAN MACHINIST.

Help Wanted.

Draftsman, on boiler-setting work. Address, stating salary and experience, Box 188, AMERICAN MACHINIST.

Wanted—Four first-class tool-makers, also five first-class pattern makers. Bullock Electric Mfg. Co., Cincinnati, Ohio.

Wanted—First-class designer and draftsman for presses and sheet-metal tools. Address Box 183, AMERICAN MACHINIST.

Wanted—First-class salesman for slow and medium-speed Corliss engines, by a leading engine concern. Apply by letter to Box 121, AMERICAN MACHINIST.

Draftsman wanted immediately; must have thorough experience in general engineering; one used to refrigerating work preferred. Box 192, AMERICAN MACHINIST.

Machinists wanted for floor work in small town 25 miles from New York City; steady employment given at $2.25 per day. Address Box 180, AMERICAN MACHINIST.

Wanted—A leading draftsman on crane

(*Continued on page 41.*)

OWNERS OF SHOPS,

especially repair shops, feel the want of something to make. I have several articles of merit now on the market (no experiments) and some tools. Want better shop and R.R. facilities and capital. **Who is the man?**

Address "J.," Box 1034, Gouverneur, N. Y.

The CROSS OIL FILTER

actually reduces oil bills 50% or more. Sent on approval. Capacities 3 to 120 gals. per day. Used in 21 countries. Testimonials from the leading firms in every field of industry.

THE BURT MFG. CO.
AKRON, OHIO, U. S. A.

Business Established 9 Years.

Largest Manufacturers of Oil Filters in the World.

CLEVELAND GEAR WORKS

86 Seneca Street,
CLEVELAND, OHIO.
W. R. SAWYER, Lessee.

Gear Wheels and Gear Cutting

Of all descriptions.

Get Our Prices.

Our Shops are large.
Our equipment and methods are modern.
20 Years' Experience on Knitting Machinery.

We make a specialty of Manufacturing Light Machinery for Owners or Patentees under contract. Will be glad to correspond with interested parties.

Trump Bros. Machine Co., Wilmington, Del., U. S. A.

Universal Joints

With solid stems and hardened ball.
Machine builders and designers will find them invaluable.

Vanderbeek Tool Works, Hartford, Ct.

Your Salary

will increase as your knowledge of your profession and your value to your employer increases. We will help you to a better position and higher pay if you will devote some of your spare time to study at home at a cost so low that you will not feel the outlay. Courses by mail in **MECHANICAL, STEAM AND ELECTRICAL ENGINEERING, MECHANICAL DRAWING AND MACHINE DESIGN. BEST TEXT BOOKS AND DRAWING PLATES FREE.** Seven years of experience in teaching by correspondence has made our courses the **best, most thorough and practical.** Write for our illustrated circular T, sample pages of text books, drawing plate, and booklet of letters from students all over the world.

The United Correspondence Schools,
154, 156, 158 FIFTH AVENUE, NEW YORK

Help Wanted—Continued.

work, also detail draftsman; none but first-class men need apply; state salary and experience. Address P. O. Box 1250, Pittsburgh, Pa.

Wanted—First-class mechanical draftsman to go to the country; applicants must state salary expected, nature of previous experience, age and references. Box 194, AMERICAN MACHINIST.

Wanted—Two or three good machinists can find steady positions in machine shop manufacturing steam engines; lathe hands preferred; state age and experience. Address Box 190, AMERICAN MACHINIST.

Wanted—A first-class draftsman, familiar with rolling-mill machinery, sugar mills and general transmission machinery; give age, experience and salary expected. Address Farrel Foundry & Machine Co., Ansonia, Conn.

Wanted—A young man, gradute of some first-class mechanical engineering course; man with some shop experience much preferred; permanent employment given to satisfactory man. Apply Vermont Marble Company, Proctor, Vt.

Wanted—Experienced shop foreman for small machine and blacksmith shops in Canada; general mill repairs, locomotives, stationary and marine engines, boilers and car work; state age, experience, salary, etc. Address Box 185, AMERICAN MACHINIST.

Experienced draftsman wanted for permanent position near New York City; must have had experience in shop and be capable of designing jigs, tools and light special machinery. Address, giving reference and salary expected, Box 171, AMER. MACHINIST.

Wanted—Several experienced tool-makers on drill jigs, milling fixtures and plain punch and die work; also several good general hands accustomed to experimental work and assembling automatic machinery. Call or address Ott. Mergenthaler & Co., Baltimore, Md.

Wanted—Works' manager for new dynamo and motor works building near Manchester, England; salary £250 per annum and bonus; must have held a similar position elsewhere and be thoroughly acquainted with piece-work prices with the latest tools. Box 191, AMERICAN MACHINIST.

Wanted—Two foremen for machine shop, one on iron and one on brass; 30 to 40 men in room; only those familiar with modern shop methods and of good executive ability need apply; give references, experience and salary expected. Address Box 186, AMERICAN MACHINIST.

Wanted—By large machine works in Germany, a thoroughly competent designer of large lathes, planers and large boring mills; applicants must be well acquainted with best American practice, and must also be posted on the operation of these machines; knowledge of German not essential; give full particulars as to experience, age and salary expected. Box 147, AMERICAN MACHINIST.

EXPORT AGENCY.

An American manufacturer, retired, who expects to live on the continent of Europe for several years would like to represent and introduce good American tools in the important cities abroad. He has already had business relations with and is known to many of the leading houses; speaks French and German, and should be able to establish valuable agencies for tools of real merit. He expects to sail on March 28 for London, and will be happy to call on or meet in New York or vicinity any firm whose attention this may attract.

WM. WHITLOCK, 43 W. 55th St., N. Y. City.
Formerly Manufacturer of the National Lathe Chuck.

Tapping Machines Wanted.

We would like to buy Tapping Machines. Only those with the latest improvements required. Must be suitable for tapping pipe fittings for steam, water and gas. Anyone with above to offer for sale, address,

W. G. & CO.,
Care of American Machinist.

HACK SAW BLADES

Length,	8,	9,	10,	12 inches.
Gross,	$3.60,	$3.60	—	—
Dozen,	.35,	.35	postage extra	

Next week look here for other bargains.

The Frasse Company,
17 Warren Street, New York.

(*Continued from page 40.*)

was reached, and the advance has been most notable during the past two or three weeks. The heaviest advances are on the larger machines.

Some difference of opinion exists as to the condition of the railroad trade. It is said that the Western roads are not buying so freely as the Eastern ones, but this view does not find universal acceptance. There have been no large equipments sold to the railways, but they are buying steadily in small lots, and there are now a number of inquiries in the market, one of which is from the Atchison road and is for sixteen machines of various descriptions.

Bement, Miles & Co. are doing a good business in the West. One of their orders received last week was from the Choctaw, Oklahoma & Gulf Railroad for three machines, a shaper, plate bending machine and a steam hammer; delivery, South McAlester, Indian Territory.

Quotations.

NEW YORK, Monday, March 20.

Iron—American pig, tidewater delivery:—

Pennsylvania irons:	
No. 1 X foundry	$16 75 @ 17 00
No. 2 X foundry	15 75 @ 16 00
No. 2 plain	15 25 @ 15 50
Gray forge	14 75 @ 15 00
Alabama irons:	
No. 1 foundry	16 25 @ 16 50
No. 2 foundry	15 75 @ 16 00
No. 3 foundry	15 25 @ 15 50
No. 1 soft	16 25 @ 16 50
No. 2 soft	15 75 @ 16 00
Foundry forge	15 00 @ 15 25

Bar Iron—Base—Mill price, in carloads, on dock: Common, 1.48 @ 1.50c., nominally; refined, 1.58 @ 1.60c. Store prices: Common, 1.65 @ 1.70c.; refined, 1.75c., upward. Mills are said to be making only refined iron at present.

Tool Steel—Base Sizes—Standard quality, 6 @ 7c.; extra grades, 12 @ 14c.; special grades, 16c. and upward.

Machinery Steel—Ordinary brands, from store, in small lots, 2.00c.

Cold Rolled Steel Shafting—Base, sizes, from store in small lots, 2.75c.

Copper—Carload lots, Lake Superior ingot, 17½c.; electrolytic, 17c.; casting copper, 16¾c. Some are asking more, while Metal Exchange quotations indicate still lower prices.

Pig Lead—Carload lots, 4.42½ @ 4.45c., f. o. b. New York.

Pig Tin—For 5 and 10 ton lots, 23¾c., f. o. b. New York.

Spelter—In carload lots, 6¼c., New York delivery.

Antimony—Cookson's is quoted 11 @ 11½c., the latter price for single casks. Large quantities of some brands may be had at 9¾ @ 9⅞c.

Lard Oil—Prime city, present make, 45 @ 47c for a good brand, in wholesale lots.

Manufacturers.

At Wyoming, Pa., James Eagan is building an addition to his machine shop.

The Nut and Bolt Works, Greensburg, Pa., which were destroyed by fire on January 6, are to be rebuilt.

Parke Bros., of Pittsburgh, have recently taken out a permit for the erection of a machine shop to cost $16,000.

Messrs. Manning, Maxwell & Moore have opened a branch office at 26 South Water street, Cleveland, in charge of Mr. Frank B. Ward.

Articles of incorporation of the Empire Steel & Iron Company, with an authorized capital of $5,000,000, were recently filed. The incorporators are Edward K. Sumerwell, East

We Make..... A Specialty of IMPROVED METAL PLANERS L. W. POND MCH. CO Worcester, Mass., U. S. A.

Orange, N. J.; Charles A. O'Mally, Brooklyn, and Arthur L. Bissell, of New York.

The Wernicke Elastic Desk Company, Grand Rapids, Mich., is making quite an extensive addition to its plant. The new building will be a continuation of the present building toward the south, and will be two stories high with a 50-foot frontage.

The co-partnership firm of Krajewski, Pesant & Co., New York, has been dissolved, and the assets and good will of the business heretofore conducted under the firm name and style of Krajewski, Pesant & Co. have been conveyed to the Krajewski-Pesant Company,

N. P. Pratt, of the N. P. Pratt Laboratory, Atlanta, Ga., informs us that he will soon move into the new laboratory building recently constructed with a view to the manufacture of acid valves, acid cocks, etc., and machinery for this new addition will be needed.

The Standard Stamping Company, whose tinware factory is located at Second and Chambers streets, St. Louis, Mo., is planning the erection of a new plant for manufacturing extra-coated enameled ware. The company is now negotiating for the construction of the plant.

The National Cash Register Company, of Dayton, Ohio, are preparing to build additions to their foundry and some other portions of the plant, and expect to invest about $40,000 in new machinery, most of which will be automatic, and will be used in manufacturing operations.

The partnership between Edgar T. Ward, Geo. Nash and John Ward, trading as Ward & Nash, Boston, Mass., has been dissolved, and a new firm has been constituted of Edgar T. Ward and his sons, John Ward and Edgar Ward, who will continue the business under the style of Ed. T. Ward & Sons.

The Titusville (Pa.) Radiator Works were partially destroyed by fire recently. The loss is estimated at from $35,000 to $40,000. The origin of the fire is unknown. The plant was recently merged with others in the American Radiator Company, and employed 200 men. It will be rebuilt at once.

Steger & Co. will build a piano factory at Steger, Ill., near Chicago Heights, from plans by Fred Aischlager. The building will be three stories in hight and will have ground dimensions of 135x160 feet. The outer walls will be constructed of brick and stone. The structure when completed will have cost $25,000.

Contracts for the construction of a temporary factory for the recently incorporated Depew (N. Y.) Manufacturing Company, have been let, and the building will be erected on a plot of twenty acres which the company has just purchased near the Lehigh Valley Railroad and the French Road at Depew. When the building is completed it will be used for the manufacture of agricultural machinery.

The National Pneumatic Tool Company, with offices at 18 South Fifteenth street, Philadelphia, Pa., has been organized with capital of $200,000, which we understand is fully paid. It will manufacture and deal in a full line of pneumatic tools and appliances for riveting, chipping, calking, etc. Its officers are: President, W. B. Henry; General Manager, C. H. Haeseler; Secretary, G. B. Harris, and Treasurer, Winthrop Sargent.

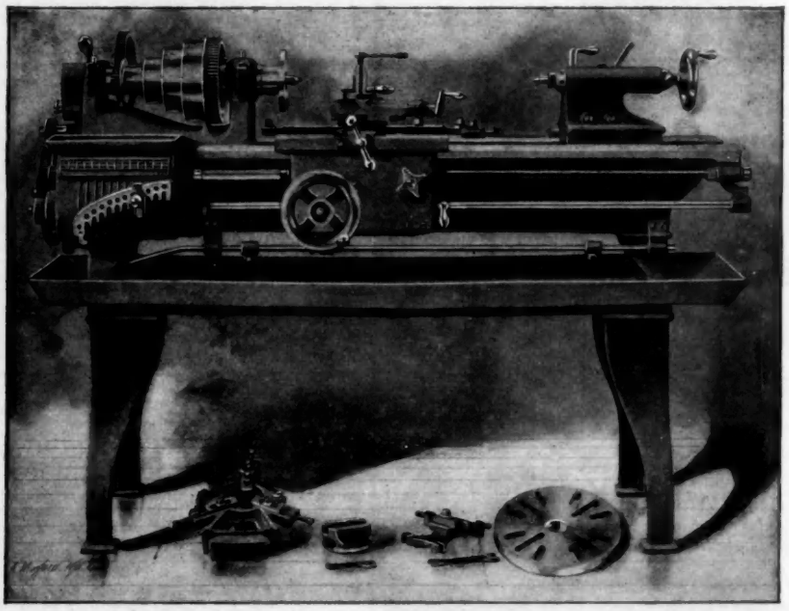
In the wake of the Link Belt Machinery Company's increase of capital from $250,000 to $375,000, comes the announcement that additions will be made to its manufacturing plant at Thirty-ninth street and Stewart avenue, Chicago, Ill. Plans have been drawn for a new building to be used as a wrought-iron foundry, of brick and stone, 200 feet square, one and one-half stories in hight and of modern steel construction throughout.

The Hendey Machine Co.

TORRINGTON, CONN.

This Company is the sole owner of Letters Patents Nos. 470,591, 519,294 and 549,006, granted to W. P. Norton for Improvements in Engine Lathes.

We take this method of notifying the public that we have already commenced suit against infringers of these patents, and that should it be found necessary to the protection of our rights, additional suits will be brought against manufacturers, vendors and users of infringing lathes.



The merits of these improvements have been widely recognized and have been wantonly copied. We shall take vigorous steps to protect our own.

The Hendey Machine Co.,

TORRINGTON, CONN.

AGENTS FOR THE PACIFIC COAST:
Pacific Tool and Supply Co., San Francisco, Cal. J. W. Cregar, Philadelphia Bourse Exhibition.

EUROPEAN AGENTS:
Schuchardt & Schutte, Berlin, Vienna, Brussels. Chas. Churchill & Co., London and Birmingham, England
Adolph Janssens, Paris, France.